Bowman

Traffic Impact Analysis

Garrisonville Chick-fil-A

Garrisonville Rd and Shelton Shop Rd
Stafford County, Virginia

Prepared for:

Garrisonville Road Realty, LLC

June 3rd, 2022

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Bowman Job # 100397-01-001

Table of Contents

List of Figures

List of Tables

Appendices

Executive Summary

This report summarizes the findings of the Traffic Impact Analysis (TIA) performed by Bowman for the proposed Chick-fil-A development located in Stafford County, VA.

The proposed Chick-fil-A is to be located within an existing shopping center. As requested by Stafford County, the purpose of this analysis is to provide an update to the 2006 traffic study for the shopping center.

Description of Proposed Development

The proposed development is to be located at the northwest corner of the intersection of Garrisonville Road and Shelton Shop Road in Stafford County, VA. The proposed site will consist of a 5,236 S.F. Fast Food Restaurant with Drive Through.

The parcel for this development is part of an existing shopping center, which currently contains the following established and operational land uses:

- 7-Eleven Convenience Store with 16 Gas Pumps
- 13,013 S.F. CVS Pharmacy with a Drive-Through
- 105,350 S.F. Mini-Warehouse (Existing Stafford Storage Facility)

Access to this overall development is provided via one (1) right-in only driveway accessing the existing CVS, one (1) signalized intersection which provides full access to the entire development, and one (1) right-in/right-out driveway that provides access to both the 7-Eleven Convenience Store and the proposed development.

Background Information

The overall retail development was approved in 2006, and a traffic impact study supporting the development was also prepared on February 17, 2006 by Vanasse Hangen Brustlin, Inc. The approved traffic study for the site included the following land uses:

- Convenience Store with 16 Gas Pumps
- 2,818 S.F. Fast Food Restaurant with Drive Through
- 13,013 S.F. Pharmacy with Drive Through
- 60,000 S.F. Office

The traffic study recommended roadway improvements necessary to mitigate the traffic impact of the overall retail development on Garrisonville Road, and these recommended roadway improvements were constructed as part of the plan development.

However, upon the development of the overall site, the Office land use was never constructed and instead was replaced with the Stafford Storage Facility. The Stafford Storage Facility generates fewer trips than the office use, and therefore, the total trips forecasted in the original traffic study have not yet been generated by the overall development.

As previously noted, the proposed development is a 5,236 S.F. Fast Food Restaurant with Drive Through, which is larger than the originally planned 2,818 S.F. Restaurant from the original traffic study. Therefore, Bowman prepared a trip generation comparison evaluation to determine the difference in trip generation between the existing land uses/proposed Chick-fil-A and the 2006 traffic study.

The results of that trip generation comparison evaluation indicated that the existing land uses and the proposed Chick-fil-A are expected to generate fewer primary trips than what was forecasted in the approved 2006 traffic study.

Although the proposed site is projected to generate fewer primary trips, Stafford County requested that Bowman provide an update to the 2006 traffic study to examine the potential impact that the addition of the Chick-fil-A development will have on the existing roadway network.

Scope of Work

The TIA scope of work for this analysis was prepared per the VDOT Traffic Impact Analysis Regulations.

For the purposes of this analysis, the following study intersections were analyzed in this report:

1. Garrisonville Road and Shelton Shop Road (Signalized)
2. Garrisonville Road and Existing Right-In/Right-Out Driveway (Unsignalized)

For the purposes of this study, it is anticipated that the proposed development will be constructed and fully operational by year 2023. Therefore, the following scenarios were evaluated as part of this study:

- Existing Conditions (2022)
- Future Conditions (2023) without the proposed development (No Build)
- Future Conditions (2023) with the proposed development (Build)

Programmed Improvements

It is Bowman's understanding that the County has two major construction projects planned in the area that are to be completed in the near future. The two projects are as follows:

Shelton Shop Road:

Shelton Shop Road is proposed to be widened to three (3) lanes from Garrisonville Road to Mountain View Road. This is a SMART SCALE project worth $22.7M which was approved in the 4th round. The completion time frame for this project has not yet been determined.

Garrisonville Road:

Garrisonville Road is proposed to be widened to six (6) lanes from Eustace Road (Route 751) to Shelton Shop Road. This project is estimated to be worth $29.5M and the completion time frame for this project has not yet been determined.

It is anticipated that both future projects will enhance/improve the existing operations of the Garrisonville Road and Shelton Shop Road intersection.

Trip Generation

Trip generation for the proposed development was calculated based on the calculations and formulae contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*.

The proposed development is expected to generate 233 total trips (119 in and 114 out) during the morning peak hour, 173 total trips (90 in and 83 out) during the evening peak hour, and 2,445 total trips (1,222 in and 1,223 out) during an average weekday.

Several of the trips associated with the proposed development are "pass-by" trips, or trips that are already on the roadway network and are temporarily diverted into the site. Of the projected trips outlined above, the summary of "primary" trips (trips new to the roadway network) for the site is as follows:

- Morning Peak Hour: 116 primary trips (59 in and 57 out)
- Evening Peak Hour: 77 primary trips (40 in and 37 out)
- Average Weekday: 1,223 primary trips (611 in and 612 out)

Capacity Analysis Results

To evaluate the traffic operations with the proposed development in place, capacity analyses were completed at the two (2) study intersections included in this report. The purpose for this analysis was to compare the results of the No Build and Build Conditions to identify areas impacted by the proposed development.

The results of this analysis indicate the following:

2022 Existing Conditions

- Garrisonville Road and Shelton Shop Road
    - This intersection currently operates at an acceptable overall level of service "D" during the morning peak hour.
        - The northbound left turn/through movement currently operates at a LOS F during the morning peak hour.
        - The eastbound left turn, eastbound right turn, northbound left turn/through, and northbound right turn queues all currently exceed the available storage for these movements during the morning peak hour.
    - This intersection currently operates at an overall level of service "E" during the evening peak hour.
        - The eastbound through movement, eastbound approach, westbound left turn movement, northbound left turn/through movement, and the southbound turning movements and approach all currently operate at a LOS F during the evening peak hour.
        - The eastbound left turn, eastbound right turn, westbound left turn, westbound right turn, northbound left turn/through movement, and the southbound right turn queues all currently exceed the available storage for these movements during the evening peak hour.

2023 No Build vs. Build Conditions

- Garrisonville Road and Shelton Shop Road
    - During the morning peak hour, this intersection is projected to operate at an acceptable overall level of service "D" during both the No Build and Build Conditions.
        - **There are no projected changes in levels of service from No Build to Build Conditions.**
        - This intersection is projected to have turning movements and approaches with failing levels of service (LOS E and F) during both the No Build and Build Conditions. These failing conditions are existing, and the site traffic is not expected to greatly increase the delay to any of these movements.
    - During the evening peak hour, this intersection is projected to operate at an overall level of service "E" during both the No Build and Build Conditions.
        - The westbound through movement is projected to operate at a LOS C during the No Build Conditions and a LOS D during the Build Conditions. However, the projected increase in delay to this movement is only 6.0 seconds.
        - **There are no other projected changes in levels of service from No Build to Build Conditions.**
        - This intersection is projected to have turning movements and approaches with failing levels of service (LOS E and F) during both the No Build and

Build Conditions. These failing conditions are existing, and the site traffic is not expected to greatly increase the delay to any of these movements.

Conclusions

The results of the trip generation comparison evaluation indicated that the existing land uses and the proposed Chick-fil-A are expected to generate fewer primary trips than what was forecasted in the approved 2006 traffic study.

The results of the capacity analysis also indicate that there are existing capacity constraints at the intersection of Garrisonville Road and Shelton Shop Road. However, there are no projected changes in levels of service for these movements at this intersection from No Build to Build Conditions.

It is anticipated that the County's future construction projects along Garrisonville Road and Shelton Shop Road will enhance/improve the existing operations of the Garrisonville Road/Shelton Shop Road intersection, and potentially alleviate these existing capacity constraints.

Based on the results of the analysis contained in this report, the addition of the site traffic associated with the proposed development is not expected to adversely impact the operations of the existing roadway network.

Introduction

This report summarizes the findings of the Traffic Impact Analysis (TIA) performed by Bowman for the proposed Chick-fil-A development located in Stafford County, VA.

The proposed Chick-fil-A is to be located within an existing shopping center. As requested by Stafford County, the purpose of this analysis is to provide an update to the 2006 traffic study for the shopping center.

Background Information

The proposed development is to be located at the northwest corner of the intersection of Garrisonville Road and Shelton Shop Road in Stafford County, VA. **Figure 1** depicts the site location.

Figure 1. Site Location

The Applicant is proposing to develop the parcel with a 5,236 S.F. Fast Food Restaurant with Drive Through. As shown in **Figure 1**, this parcel is a portion of an existing shopping center, which currently contains the following established and operational land uses:

- 7-Eleven Convenience Store with 16 Gas Pumps
- 13,013 S.F. CVS Pharmacy with a Drive-Through
- 105,350 S.F. Mini-Warehouse (Existing Stafford Storage Facility)

The conceptual plan for the proposed site is depicted on **Figure 2** and included in **Appendix A.**

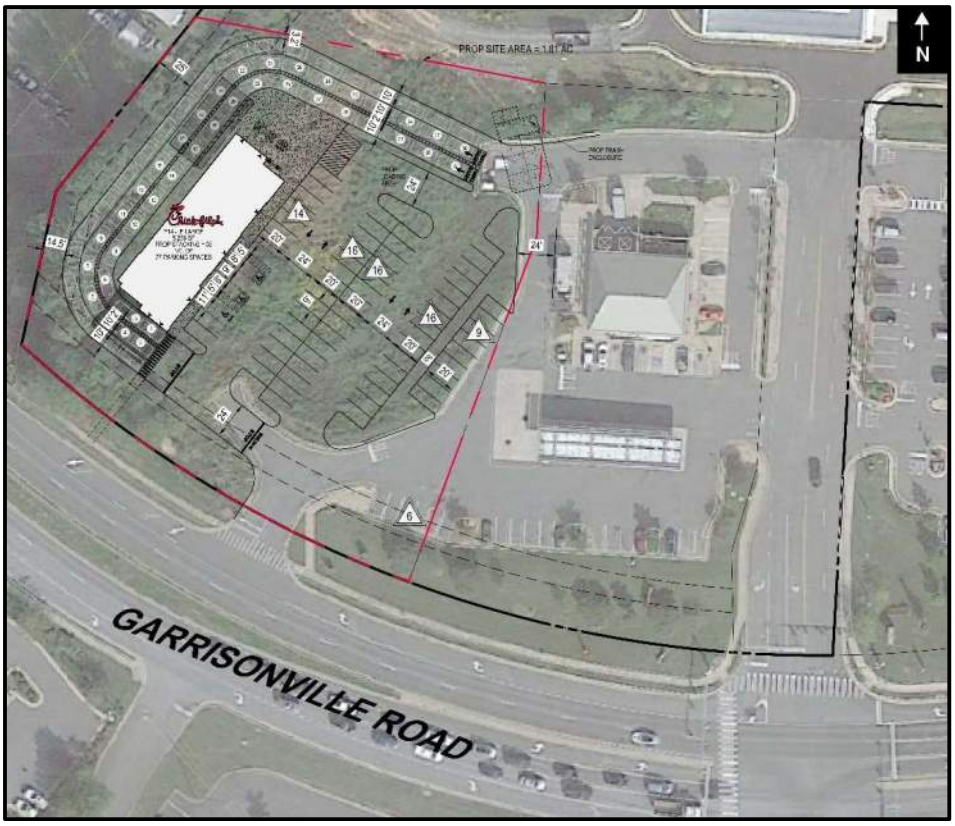


Figure 2. Conceptual Plan

As shown in **Figures 1 and 2,** access to the site is provided via one (1) right-in only driveway accessing the existing CVS, one (1) signalized intersection which provides full access to the entire development, and one (1) right-in/right-out driveway that provides access to both the 7-Eleven Convenience Store and the proposed development.

The overall retail development was approved in 2006, and a traffic impact study supporting the development was also prepared on February 17, 2006 by Vanasse Hangen Brustlin, Inc. The approved traffic study for the site included the following land uses:

- Convenience Store with 16 Gas Pumps
- 2,818 S.F. Fast Food Restaurant with Drive Through
- 13,013 S.F. Pharmacy with Drive Through
- 60,000 S.F. Office

A copy of the traffic study for the overall development is included in **Appendix B.** The traffic study recommended roadway improvements necessary to mitigate the traffic impact of the overall retail development on Garrisonville Road, and these recommended roadway improvements were constructed as part of the plan development.

However, upon the development of the overall site, the Office land use was never constructed and instead was replaced with the Stafford Storage Facility. The Stafford Storage Facility generates fewer trips than the office use, and therefore, the total trips forecasted in the original traffic study have not yet been generated by the overall development.

As previously noted, the proposed development is a 5,236 S.F. Fast Food Restaurant with Drive Through, which is larger than the originally planned 2,818 S.F. Restaurant from the original traffic study. Therefore, Bowman prepared a trip generation comparison evaluation to determine the difference in trip generation between the existing land uses/proposed Chick-fil-A and the 2006 traffic study.

The Trip Generation Comparison Evaluation is included in **Appendix C**, and the results of that evaluation indicated that the existing land uses and the proposed Chick-fil-A are expected to generate fewer primary trips than what was forecasted in the approved 2006 traffic study.

Although the proposed site is projected to generate fewer primary trips, Stafford County requested that Bowman provide an update to the 2006 traffic study to examine the potential impact that the addition of the Chick-fil-A development will have on the existing roadway network.

Scope of Work

The TIA scope of work for this analysis was prepared per VDOT Traffic Impact Analysis Regulations. In accordance with VDOT requirements, the following items were analyzed in this report:

Study Periods

- Existing Conditions (2022)
- Future Conditions (2023) without the proposed development (No Build)
- Future Conditions (2023) with the proposed development (Build)

Intersections Evaluated

1. Garrisonville Road and Shelton Shop Road (Signalized)
2. Garrisonville Road and Existing Right-In/Right-Out Driveway (Unsignalized)

Background Growth Rate

- In order to provide a conservative amount of background traffic growth, a background growth rate of 2.0% per year will be used in the study.

Existing Roadway Network

Garrisonville Road within the identified study area is a four-lane divided roadway with auxiliary turning lanes, listed as a Major Collector on VDOT's Functional Classification Map. It has an east-west alignment with a posted speed limit of 40 mph.

Shelton Shop Road within the identified study area is a two-lane roadway with auxiliary turning lanes, listed as a Major Collector on VDOT's Functional Classification Map. It has a north-south alignment with a posted speed limit of 35 mph.

Existing Intersection Configuration

Intersection of Garrisonville Road and Shelton Shop Road

This intersection is currently a four-legged signalized intersection with pedestrian crossings across the eastbound, northbound, and southbound approaches. Garrisonville Road has an east-west alignment and Shelton Shop Road has a north-south alignment as shown on **Figure 3.**

Figure 3. Aerial of Garrisonville Road and Shelton Shop Road Intersection

The eastbound and westbound approaches consist of one exclusive left turn lane, two through lanes, and one exclusive right turn lane. The northbound approach consists of one shared left turn/through lane and two exclusive right turn lanes. The southbound approach consists of one exclusive left turn lane, one through lane, and one exclusive right turn lane.

Data Collection

Turning Movement Counts, Traffic Signal Timings, and Traffic Signal Phasing

The Virginia Department of Transportation (VDOT) supplied Bowman with Synchro files which contained peak hour traffic volumes, traffic signal timing information, and traffic signal phasing information at the intersection of Garrisonville Road and Shelton Shop Road.

The turning movement counts included in these Synchro files were collected in 2018, prior to the construction of the Stafford Storage portion of the overall development. Therefore, the site trips associated with the Stafford Storage will need to be added to the roadway network to reflect existing conditions.

Programmed Improvements

It is Bowman's understanding that the County has two major construction projects planned in the area to be completed in the near future. The two projects are:

Shelton Shop Road:

Shelton Shop Road is proposed to be widened to three (3) lanes from Garrisonville Road to Mountain View Road. This is a SMART SCALE project worth $22.7M which was approved in the 4th round. The completion time frame for this project has not yet been determined.

Garrisonville Road:

Garrisonville Road is proposed to be widened to six (6) lanes from Eustace Road (Route 751) to Shelton Shop Road. This project is estimated to be worth $29.5M and the completion time frame for this project has not yet been determined.

It is anticipated that both future projects will enhance/improve the existing operations of the Garrisonville Road and Shelton Shop Road intersection.

Traffic Forecast and Background Traffic

For the purposes of this analysis, it is anticipated that the Fast Food Restaurant will be constructed and fully operational by the year 2023. The following scenarios were evaluated as part of this study:

- Existing Conditions (2022)
- Future Conditions (2023) without the proposed development (No Build)
- Future Conditions (2023) with the proposed development (Build)

The 2018 Existing Traffic Volumes supplied by VDOT are depicted on **Exhibit 1** in **Appendix D.**

As previously mentioned, a background growth rate factor of 2.0% per year was applied to the traffic counts to grow the existing volumes to Future Conditions. This growth rate factor was applied to project the 2018 Existing Traffic Volumes four (4) years to develop the 2022 Background Traffic Volumes, which are depicted on **Exhibit 2** in **Appendix D.**

The Stafford Storage portion of the overall development was not constructed at the time of the traffic counts, and therefore the site trips associated with this development were added to the roadway network to reflect existing conditions. The projected trips associated with this development are depicted on **Exhibit 3** in **Appendix D.**

These trips were then added to the 2022 Background Traffic Volumes to create the 2022 Existing Traffic Volumes, which are depicted on **Exhibit 4** in **Appendix D.** The aforementioned growth rate of 2.0% per year was then applied to project the 2022 Existing Traffic Volumes one (1) year to develop the 2023 No Build Traffic Volumes, which are depicted on **Exhibit 5** in **Appendix D.**

Proposed Development

The Applicant is proposing to develop the site with a 5,236 S.F. Fast Food Restaurant with a Drive-Through Window.

Trip Generation and Trip Distribution

The Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* was used to determine the number of trips generated by the proposed land use. **Table 1** displays the trip generation for the proposed development.

Table 1. Site Trip Generation

Development	Land Use	Size	Units	Total Trips [1]			Pass-By Trips [2]			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday AM Peak Hour												
Fast Food Restaurant w/Drive-thru	934	5,236	SF	119	114	233	60	57	117	59	57	116
Total, AM Peak Hour				**119**	**114**	**233**	**60**	**57**	**117**	**59**	**57**	**116**
Weekday PM Peak Hour												
Fast Food Restaurant w/Drive-thru	934	5,236	SF	90	83	173	50	46	96	40	37	77
Total, PM Peak Hour				**90**	**83**	**173**	**50**	**46**	**96**	**40**	**37**	**77**
Average Weekday												
Fast Food Restaurant w/Drive-thru	934	5,236	SF	1222	1223	2445	611	611	1222	611	612	1223
Total, PM Peak Hour				**1222**	**1223**	**2445**	**611**	**611**	**1222**	**611**	**612**	**1223**

(1) Based on the Institute of Transportation Engineers Trip Generation, 11th Edition for Land Use 934.
(2) Pass-by rates of 50% AM and 55% PM for Land Use 934 from the ITE Trip Generation Manual, 11th Edition.

As shown in **Table 1**, the proposed Fast Food Restaurant with Drive Through is expected to generate 233 total trips (119 in and 114 out) during the morning peak hour, 173 total trips (90 in and 83 out) during the evening peak hour, and 2,445 total trips (1,222 in and 1,223 out) during an average weekday.

Of these trips, 116 are primary trips (59 in and 57 out) during the morning peak hour, 77 are primary trips (40 in and 37 out) during the evening peak hour, and 1,223 are primary trips (611 in and 612 out) during an average weekday. The remainder of the projected trips associated with the proposed development are expected to be pass-by trips.

These traffic volumes were then distributed to the roadway network in accordance with a site traffic distribution pattern developed from the 2022 existing traffic volumes. The primary site-generated trip distribution is depicted on **Exhibit 6** in **Appendix D,** and the corresponding site-generated primary trips are depicted on **Exhibit 7** in **Appendix D.**

Due to the directional nature of pass-by trips, two separate pass-by distribution rates were developed for the study area (one for the morning peak hour and one for the evening peak hour). The pass-by site-generated trip distribution is depicted on **Exhibit 8** in **Appendix D,** and the corresponding site-generated pass-by trips are depicted on **Exhibit 9** in **Appendix D.**

The total development site-generated trips are depicted on **Exhibit 10** in **Appendix D.**

The projected site trips were then added to the 2023 No Build Traffic Volumes to create the 2023 Build Traffic Volumes, which are depicted on **Exhibit 11** in **Appendix D.**

Capacity Analysis

The study intersections were analyzed for each scenario using the 6th Edition of the Highway Capacity Manual (HCM) methodologies using the computer software package Synchro 10 with SimTraffic. The analysis uses capacity, Level of Service (LOS), control delay, and queuing as the criteria for the performance of the intersections.

Capacity, as defined by the HCM, is a measure of the maximum number of vehicles in an hour that can travel through an intersection or section of roadway under typical conditions. Level of Service (LOS) is a marker of the driving conditions and perception of drivers while traveling during the given time period. LOS ranges from LOS "A", which represents free-flow conditions, to LOS "F", which represents breakdown conditions. **Table 2** shows the LOS for intersections as defined by the HCM.

Table 2. HCM Level of Service Criteria

Unsignalized Intersections		Signalized Intersections	
Level of Service	Average Control Delay (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤10	A	≤10
B	>10-15	B	>10-20
C	>15-25	C	>20-35
D	>25-35	D	>35-55
E	>35-50	E	>55-80
F	≥50	F	≥80

Control delay is a measure of the total amount of delay experienced by an individual vehicle and includes delay related to deceleration, queue delay, stopped delay, and acceleration. **Table 2** shows the amount of control delay (in seconds per vehicle) that corresponds to the LOS for signalized and unsignalized intersections.

The reported queues, or linear distance of delayed vehicles, for the intersections in this study are the maximum queues reported by SimTraffic after 10 runs of 60 minutes each with a 15-minute seeding time. They are reported to ensure that the storage lengths of lanes at intersections are of adequate length and that queued vehicles will not interfere with free flow vehicles or adjacent intersections.

Capacity analyses were completed for the following scenarios during the morning and evening peak hours:

- Existing Conditions (2022)
- Future Conditions (2023) without the proposed development (No Build)
- Future Conditions (2023) with the proposed development (Build)

Capacity Analysis of Existing Conditions (Year 2022)

A capacity analysis under the Existing Year 2022 Conditions was conducted for the study intersections previously described in this report. The Existing Conditions capacity analysis results are included in **Appendix E.**

Intersection of Garrisonville Road and Shelton Shop Road

Based on the results of the capacity analysis under Existing Conditions, the intersection of Garrisonville Road and Shelton Shop Road currently operates at an overall level of service "D" during the morning peak hour and an overall level of service "E" during the evening peak hour.

During the morning peak hour, the northbound left turn/through movement currently operates at a LOS F. The eastbound left turn movement, westbound left turn movement, northbound

approach, and the southbound turning movements and approach all currently operate at a LOS E. All other turning movements and approaches currently operate at a LOS D or better.

The eastbound left turn, eastbound right turn, northbound left turn/through, and northbound right turn queues all currently exceed the available storage for these movements during the morning peak hour.

During the evening peak hour, the eastbound through movement, eastbound approach, westbound left turn movement, northbound left turn/through movement, and the southbound turning movements and approach all currently operate at a LOS F. The eastbound left turn movement, westbound approach, and northbound approach currently operate at a LOS E. All other turning movements and approaches currently operate at a LOS D or better.

The eastbound left turn, eastbound right turn, westbound left turn, westbound right turn, northbound left turn/through movement, and the southbound right turn queues all currently exceed the available storage for these movements during the evening peak hour.

As noted above, there are capacity constraints at this intersection under existing conditions, with failing levels of service "E" and "F" for several turning movements and approaches, as well as existing queues which exceed the available storage.

The capacity analysis results are summarized in **Table 3.**

Table 3. 2022 Existing Conditions Capacity Analysis – Garrisonville Road and Shelton Shop Road

INTERSECTION				AM Peak Hour Conditions			PM Peak Hour Conditions		
	Approach	Movement	Storage (ft)	DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #1: Garrisonville Rd and Shelton Shop Rd (2022 Existing Conditions)	EB	L	230	68.0	E	229	77.9	E	228
		T	875	47.4	D	593	104.3	F	751
		R	310	0.0	A	309	0.0	A	304
		Approach	--	47.6	D	--	103.4	F	--
	WB	L	345	79.8	E	301	123.4	F	345
		T	+1,000	25.1	C	294	29.1	C	764
		R	280	20.2	C	34	16.8	B	280
		Approach	--	38.0	D	--	58.7	E	--
	NB	LT	450	91.4	F	502	111.5	F	448
		R	450	42.2	D	758	23.3	C	219
		Approach	--	58.6	E	--	59.1	E	--
	SB	L	300	72.2	E	80	87.9	F	114
		T	300	72.7	E	93	124.6	F	202
		R	90	68.8	E	49	89.1	F	90
		Approach	--	71.8	E	--	107.0	F	--
	OVERALL			**48.4**	**D**	**--**	**71.5**	**E**	**--**

*Extracted from SimTraffic simulation software

Intersection of Garrisonville Road and Right-In/Right-Out Driveway

Based on the results of the capacity analysis under Existing Conditions, the southbound approach at the intersection of Garrisonville Road and the Right-In/Right-Out Driveway currently operates at an acceptable LOS B during the morning peak hour and an acceptable LOS C during the evening peak hour.

All other turning movements and approaches at the intersection are free-flowing, and therefore do not produce delay. The capacity analysis results are summarized in **Table 4.**

Table 4. 2022 Existing Conditions Capacity Analysis – Garrisonville Road and RIRO Driveway

INTERSECTION				AM Peak Hour Conditions			PM Peak Hour Conditions		
				DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #2: Garrisonville Rd and RIRO Dwy (2022 Existing Conditions)	Approach	Movement	Storage (ft)						
	SB	R	--	12.0	B	47	19.4	C	93

*Extracted from SimTraffic simulation software

Capacity Analysis Comparison – No Build vs. Build Conditions (Year 2023)

Capacity analyses were conducted for the No Build and Build Conditions for the opening year 2023. The primary purpose for this approach was to compare the results in order to identify areas impacted by the proposed development.

Please note that due to the existing capacity constraints at the intersection of Garrisonville Road and Shelton Shop Boulevard outlined above, the intersection traffic signal timings were optimized under Build Conditions. The capacity analysis results are included in **Appendices F and G.**

Intersection of Garrisonville Road and Shelton Shop Road

Morning Peak Hour

Based on the results of the capacity analysis during the morning peak hour, the intersection of Garrisonville Road and Shelton Shop Road is projected to operate at an acceptable overall level of service "D" during both the No Build and Build Conditions, with an increase in delay of 4.9 seconds.

There are no projected changes in levels of service from No Build to Build Conditions.

The westbound left turn movement and northbound left turn/through movements are projected to operate at a LOS F under both the No Build and Build Conditions, with increases in delay of 4.9 seconds and 9.0 seconds, respectively.

The eastbound left turn movement, northbound approach, and the southbound turning movements and approach are all projected to operate at a LOS E under both the No Build and Build Conditions. All other turning movements and approaches are projected to operate at a LOS D or better during both the No Build and Build Conditions.

The eastbound left turn, eastbound right turn, northbound left turn/through, and northbound right turn queues are projected to exceed the available storage for these movements under both No Build and Build Conditions. However, please note that the increase in queue length for these movements appears to be minimal (31 feet maximum).

The remaining queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes. The capacity analysis results are summarized in **Table 5.**

Table 5. 2023 AM Peak Hour Capacity Analysis – Garrisonville Road and Shelton Shop Road

INTERSECTION				AM Peak (No Build) Conditions			AM Peak (Build) Conditions		
	Approach	Movement	Storage (ft)	DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #1: Garrisonville Rd and Shelton Shop Rd (2023 No Build Conditions vs. 2023 Build Conditions)	EB	L	230	68.0	E	229	77.8	E	230
		T	875	48.6	D	556	52.2	D	580
		R	310	0.0	A	309	0.0	A	309
		Approach	--	48.8	D	--	53.7	D	--
	WB	L	345	81.1	F	291	86.0	F	311
		T	+1,000	25.2	C	273	29.7	C	271
		R	280	20.2	C	87	24.0	C	75
		Approach	--	38.4	D	--	42.3	D	--
	NB	LT	450	94.5	F	579	103.5	F	598
		R	450	42.5	D	699	42.7	D	730
		Approach	--	59.8	E	--	64.3	E	--
	SB	L	300	72.2	E	87	79.4	E	179
		T	300	72.7	E	100	67.2	E	114
		R	90	68.8	E	28	62.9	E	58
		Approach	--	71.8	E	--	74.1	E	--
	OVERALL			**49.3**	**D**	**--**	**54.2**	**D**	**--**

*Extracted from SimTraffic simulation software

Evening Peak Hour

Based on the results of the capacity analysis during the evening peak hour, the intersection of Garrisonville Road and Shelton Shop Road is projected to operate at an overall level of service "E" during both the No Build and Build Conditions, with an increase in delay of 4.8 seconds.

There are no projected changes in levels of service from No Build to Build Conditions for the majority of turning movements and approaches at the intersection. Only the westbound through movement is projected to operate at a LOS C during the No Build Conditions and a LOS D during the Build Conditions, but the increase to delay for this movement is only 6.0 seconds.

The eastbound through movement, eastbound approach, westbound left turn movement, northbound left turn/through movement, and the southbound turning movements and approach are all projected to operate at a LOS F under both the No Build and Build Conditions.

The eastbound left turn movement and the westbound approach are projected to operate at a LOS E under both he No Build and Build Conditions. All other turning movements and approaches are projected to operate at a LOS D or better during both the No Build and Build Conditions.

The eastbound left turn, eastbound right turn, westbound left turn, westbound through movement, westbound right turn, and the northbound left turn/through queues are projected to exceed the available storage for these movements under both No Build and Build Conditions. However, please note that the increase in queue length for these movements appears to be minimal (30 feet).

The remaining queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes. The capacity analysis results are summarized in **Table 6.**

Table 6. 2023 PM Peak Hour Capacity Analysis – Garrisonville Road and Shelton Shop Road

INTERSECTION				PM Peak (No Build) Conditions			PM Peak (Build) Conditions		
	Approach	Movement	Storage (ft)	DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #1: Garrisonville Rd and Shelton Shop Rd (2023 No Build Conditions vs. 2023 Build Conditions)	EB	L	230	77.9	E	229	79.5	E	230
		T	875	111.0	F	796	112.8	F	848
		R	310	0.0	A	304	0.0	A	304
		Approach	--	109.9	F	--	110.4	F	--
	WB	L	345	131.7	F	345	139.6	F	345
		T	+1,000	29.6	C	1,990	35.6	D	2,020
		R	280	16.8	B	280	19.9	B	280
		Approach	--	61.7	E	--	67.8	E	--
	NB	LT	450	114.9	F	480	118.6	F	520
		R	450	23.4	C	242	23.4	C	236
		Approach	--	60.5	E	--	64.2	E	--
	SB	L	300	87.9	F	96	120.0	F	169
		T	300	124.6	F	208	116.5	F	238
		R	90	89.1	F	90	82.7	F	90
		Approach	--	107.0	F	--	112.4	F	--
	OVERALL			**75.0**	**E**	**--**	**79.8**	**E**	**--**

*Extracted from SimTraffic simulation software

Intersection of Garrisonville Road and Right-In/Right-Out Driveway

Morning Peak Hour

Based on the results of the capacity analysis during the morning peak hour, the southbound approach at the intersection of Garrisonville Road and the Right-In/Right-Out Driveway is projected to operate at an acceptable LOS B during both the No Build and Build Conditions, with an increase in delay of 0.5 seconds.

All other turning movements and approaches at the intersection are free-flowing, and therefore do not produce delay.

The queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes. The capacity analysis results are summarized in **Table 7.**

Table 7. 2023 AM Peak Hour Capacity Analysis – Garrisonville Road and RIRO Driveway

INTERSECTION				AM Peak (No Build) Conditions			AM Peak (Build) Conditions		
				DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #2: Garrisonville Rd and RIRO Dwy (2023 No Build Conditions vs. 2023 Build Conditions)	Approach	Movement	Storage (ft)						
	SB	R	--	12.1	B	57	12.6	B	77

*Extracted from SimTraffic simulation software

Evening Peak Hour

Based on the results of the capacity analysis during the evening peak hour, the southbound approach at the intersection of Garrisonville Road and the Right-In/Right-Out Driveway is projected to operate at an acceptable LOS C during both the No Build and Build Conditions, with an increase in delay of 1.8 seconds.

All other turning movements and approaches at the intersection are free-flowing, and therefore do not produce delay.

The queue results from SimTraffic do not appear to exceed the available storage for the auxiliary lanes. The capacity analysis results are summarized in **Table 8.**

Table 8. 2023 PM Peak Hour Capacity Analysis – Garrisonville Road and RIRO Driveway

INTERSECTION				PM Peak (No Build) Conditions			PM Peak (Build) Conditions		
				DELAY (S)	LOS	Maximum Queue (ft)*	DELAY (S)	LOS	Maximum Queue (ft)*
Intersection #2: Garrisonville Rd and RIRO Dwy (2023 No Build Conditions vs. 2023 Build Conditions)	Approach	Movement	Storage (ft)						
	SB	R	--	19.9	C	105	21.7	C	128

*Extracted from SimTraffic simulation software

Summary

The Applicant is proposing to develop the site with a 5,236 S.F. Fast Food Restaurant with Drive Through at the intersection of Garrisonville Road and Shelton Shop Road.

Stafford County has two major construction projects planned in the area which include the widening of both Garrisonville Road and Shelton Shop Road. It is anticipated that these future

projects will enhance/improve the existing operations of the Garrisonville Road/Shelton Shop Road intersection.

The parcel for this development is part of an existing shopping center, which currently contains the following established and operational land uses:

- 7-Eleven Convenience Store with 16 Gas Pumps
- 13,013 S.F. CVS Pharmacy with a Drive-Through
- 105,350 S.F. Mini-Warehouse (Existing Stafford Storage Facility)

The overall retail development was approved in 2006, and a traffic impact study supporting the development was also prepared on February 17, 2006 by Vanasse Hangen Brustlin, Inc. The approved traffic study for the site included the following land uses:

- Convenience Store with 16 Gas Pumps
- 2,818 S.F. Fast Food Restaurant with Drive Through
- 13,013 S.F. Pharmacy with Drive Through
- 60,000 S.F. Office

The traffic study recommended roadway improvements necessary to mitigate the traffic impact of the overall retail development on Garrisonville Road, and these recommended roadway improvements were constructed as part of the plan development.

However, upon the development of the overall site, the Office land use was never constructed and instead was replaced with the Stafford Storage Facility. The Stafford Storage Facility generates fewer trips than the office use, and therefore, the total trips forecasted in the original traffic study have not yet been generated by the overall development.

As previously noted, the proposed development is a 5,236 S.F. Fast Food Restaurant with Drive Through, which is larger than the originally planned 2,818 S.F. Restaurant from the original traffic study. Therefore, Bowman prepared a trip generation comparison evaluation to determine the difference in trip generation between the existing land uses/proposed Chick-fil-A and the 2006 traffic study.

The results of that trip generation comparison evaluation indicated that the existing land uses and the proposed Chick-fil-A are expected to generate fewer primary trips than what was forecasted in the approved 2006 traffic study.

The purpose of this traffic study is to examine the impact of this additional square footage for the original restaurant use on the existing roadway network, while also noting that the traffic impact of the original office use has been reduced from what was originally planned.

The proposed development is expected to generate 233 total trips (119 in and 114 out) during the morning peak hour, 173 total trips (90 in and 83 out) during the evening peak hour, and 2,445 total trips (1,222 in and 1,223 out) during an average weekday.

Of the projected trips outlined above, the summary of primary trips (trips new to the roadway network) for the site is as follows:

- Morning Peak Hour: 116 primary trips (59 in and 57 out)
- Evening Peak Hour: 77 primary trips (40 in and 37 out)
- Average Weekday: 1,223 primary trips (611 in and 612 out)

To evaluate the traffic operations with the proposed development in place, capacity analyses were completed at the two (2) study intersections included in this report.

The results of this analysis indicate that the proposed development is not expected to materially increase the delays and queue lengths at the existing study intersection of Garrisonville Road and Shelton Shop Road. This intersection currently experiences capacity constraints during the morning and evening peak hours, and the proposed development is not expected to compound these existing constraints.

Additionally, the existing Right-In/Right-Out driveway is expected to operate at acceptable levels of service under Build Conditions.

Conclusions

The results of the trip generation comparison evaluation indicated that the existing land uses and the proposed Chick-fil-A are expected to generate fewer primary trips than what was forecasted in the approved 2006 traffic study.

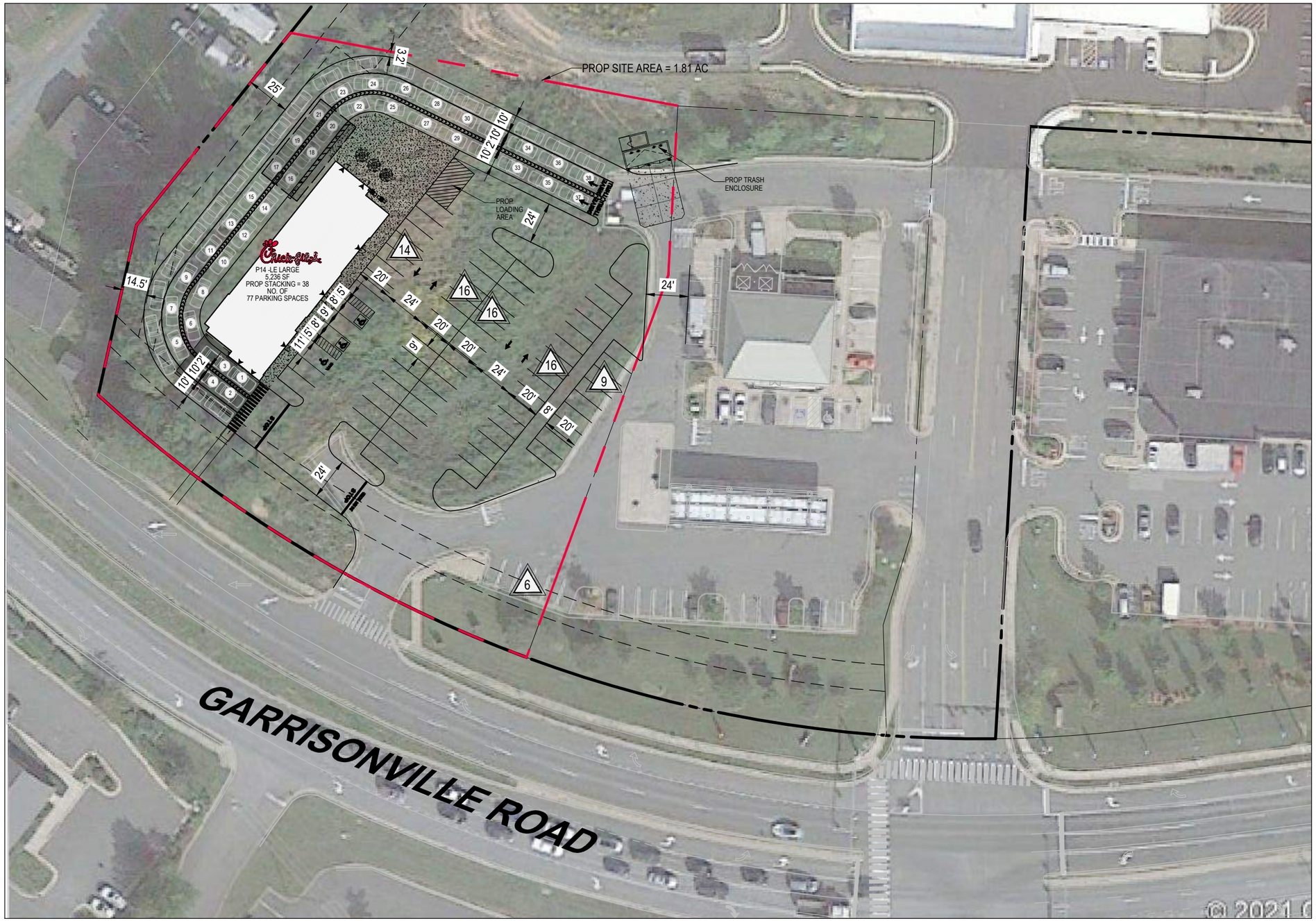
The results of the capacity analysis also indicate that there are existing capacity constraints at the intersection of Garrisonville Road and Shelton Shop Road. However, there are no projected changes in levels of service for these movements at this intersection from No Build to Build Conditions.

It is anticipated that the County's future construction projects along Garrisonville Road and Shelton Shop Road will enhance/improve the existing operations of the Garrisonville Road/Shelton Shop Road intersection, and potentially alleviate these existing capacity constraints.

Based on the results of the analysis contained in this report, the addition of the site traffic associated with the proposed development is not expected to adversely impact the operations of the existing roadway network.

Bowman

Appendix A
Conceptual Plan



CONCEPT PLAN NOTES

1. THIS CONCEPT WAS PREPARED BASED UPON A CAD FILE FROM THE BROKER ENTITLED "PLAT -6-5-18".

2. THE CONCEPT REPRESENTED HEREIN IDENTIFIES A DESIGN CONCEPT RESULTING SOLELY FROM LAYOUT PREFERENCES AND GUIDANCE DICTATED AND IDENTIFIED SOLELY BY THE CLIENT. THE FEASIBILITY WITH RESPECT TO OBTAINING LOCAL, COUNTY, STATE, AND OTHER APPLICABLE APPROVALS IS NOT WARRANTED, AND CAN ONLY BE ASSESSED AFTER FURTHER EXAMINATION AND VERIFICATION OF APPLICABLE REQUIREMENTS AND THE PROCUREMENT OF ALL NECESSARY JURISDICTIONAL APPROVALS.

3. THIS CONCEPTUAL PLAN IS PREPARED FOR CONCEPTUAL PRESENTATION PURPOSES, ONLY, AND IS NOT INTENDED TO AND SHOULD NOT BE UTILIZED AS A ZONING AND CONSTRUCTION DOCUMENT. THE EXISTING CONDITIONS SHOWN HEREON ARE BASED UPON INFORMATION THAT WAS SUPPLIED TO THE ENGINEER BY THE OWNER AND OTHERS NOT UNDER ENGINEER'S CONTROL, AT THE TIME OF PLAN PREPARATION AND MAY BE SUBJECT TO CHANGE UPON PERFORMANCE OF ADDITIONAL DUE DILIGENCE AND/OR FIELD SURVEY.

PARKING TABULATION

REQUIRED PARKING: 58 (11 SPACE PER 1000 SF)

BUILDING AREA: 5,236 SF

PROPOSED PARKING: 77 SPACES

PROPOSED STACKING: 38 SPACES

H:\21\V216509\CAD\DRAWINGS\CONCEPTS\V216509-CPTA4----->LAYOUT: CONCEPT

BOHLER //
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VIRGINIA 20186
Phone: (540) 349-4500
Fax: (540) 349-0321
VA@BohlerEng.com

CHICK-FIL-A GARRISONVILLE - CONCEPT A-1

STAFFORD COUNTY, VIRGINIA 22556

60 30 15 0 60
1"= 60'

Bowman

Appendix B
2006 Retail Development Traffic Impact Study

Transportation
Land Development
Environmental
Services

Vanasse Hangen Brustlin, Inc.

115 South 15th Street, Suite 200
Richmond, Virginia 23219-4209
804.343.7100
FAX 804.343.1713

Memorandum

To: Trey Morgan, Morgan Property Group

Date: February 17, 2006

Project No.: 31929.00

From: David P. Beardsley, P.E.

Re: Traffic Study - Proposed Retail Development at Garrisonville Road and Shelton Shop Road - REVISED

VHB has been tasked with performing a traffic assessment to determine the traffic and access impacts of a retail development planned for construction at the intersection of Garrisonville Road (Route 610) and Shelton Shop Road (Route 648) in Stafford, Virginia. The site location is illustrated in **Figure 1**.

The traffic issues addressed in this study include:

- Existing traffic conditions at the site during the weekday AM and PM peak hours of operation.
- Traffic conditions after the opening of the proposed development during the weekday AM and PM peak hours of operation.
- Recommended access improvements needed to accommodate proposed site traffic in close proximity to the intersection of Garrisonville Road and Shelton Shop Road.

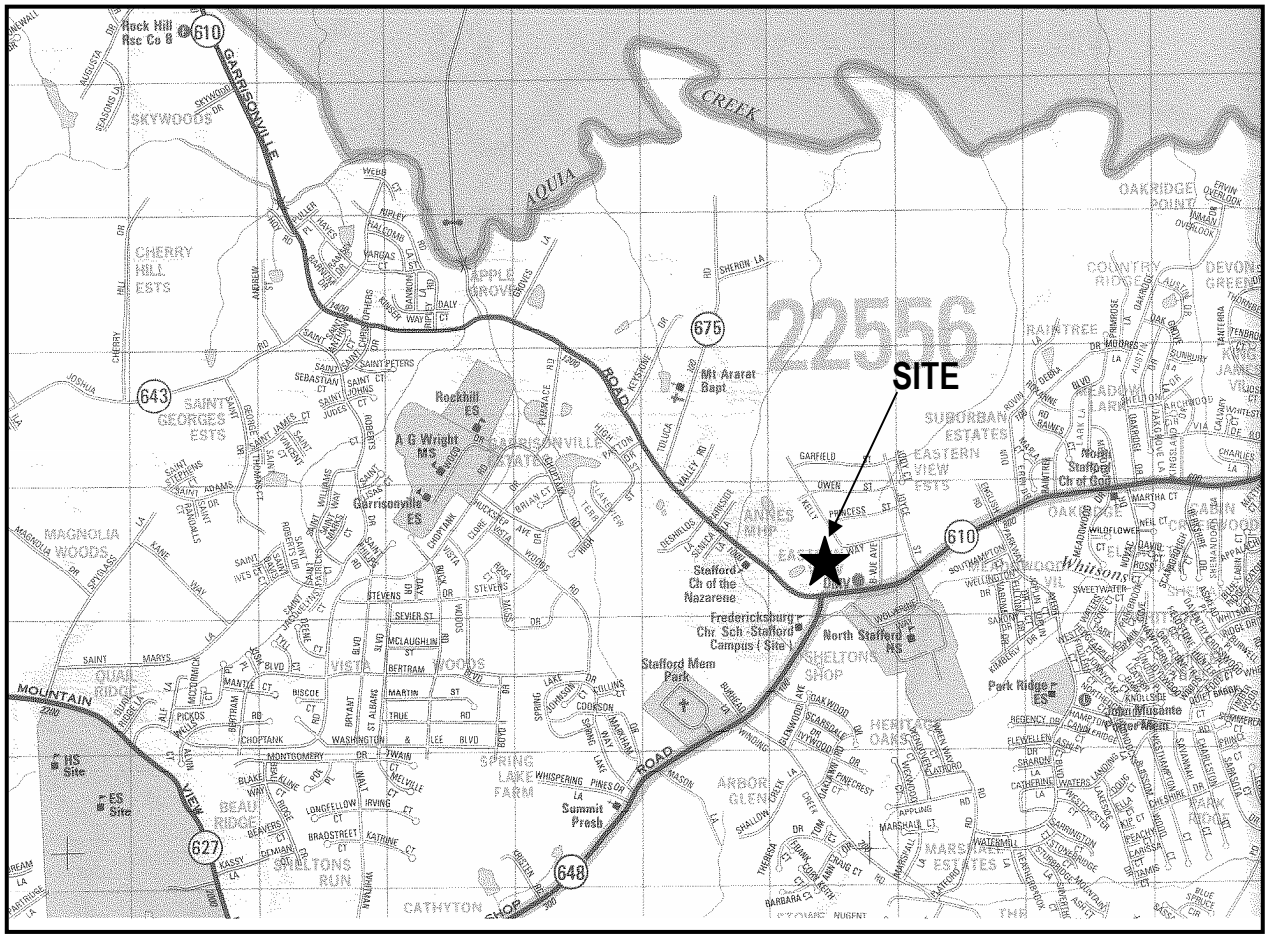
The proposed development is assumed to consist of a 13,000 s.f. pharmacy with drive-through, a convenience store with 16 gas pumps, a 2,818 s.f. fast food restaurant with drive-through, and a 60,000 s.f. general office. The proposed site plan is attached at the end of this memorandum.

Data Collection

Average Daily Traffic (ADT) Count Data

Documentation of existing traffic conditions throughout the project area consisted of the determination of Average Daily Traffic (ADT) volumes on the roadways surrounding the site, which were obtained from VDOT. The primary roads adjacent to the proposed development are Garrisonville Road and Shelton Shop Road. Garrisonville Road has an average daily traffic (ADT) volume of 18,000 vehicles per day west of Shelton Shop Road and 30,000 vehicles per day east of Shelton Shop Road. Shelton Shop Road carries of volume of 9,700 vehicles per day just south of Garrisonville Road.

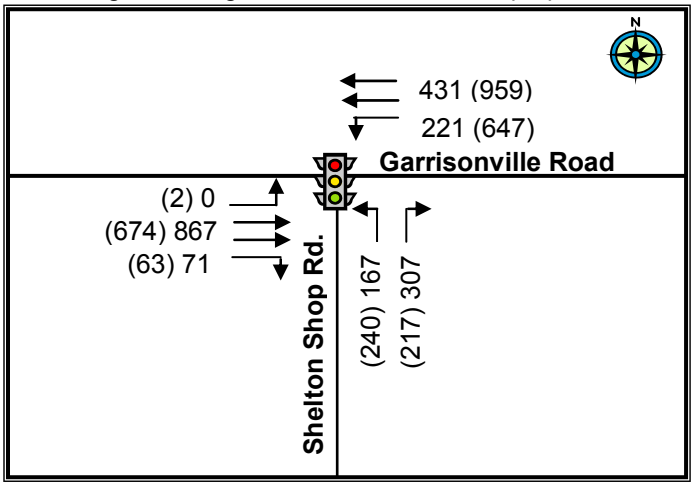
Figure 1
Site Location



Peak Hour Intersection Count Data

Intersection turning movement counts were also performed during typical weekday AM and PM peak traffic periods on Wednesday, October 19, 2005. The breakdown of the count data revealed that the weekday peak hours of operation are 7:00 AM to 8:00 AM and 5:00 PM to 6:00 PM. The existing peak hour volumes and lane usage at the intersection of Garrisonville Road and Shelton Shop Road are shown in **Figure 2**.

Figure 2
Existing Lane Usage and Traffic Counts - AM (PM) Peak Hours



Existing Traffic Operational Analysis

The peak hour turning movement counts were used to establish existing operational levels of service (LOS) at the intersection of Garrisonville Road and Shelton Shop Road using Synchro 6 traffic capacity analysis software. Traffic signal timings during the AM and PM peak periods at the intersection were obtained from VDOT's Fredericksburg District Traffic Engineering Department.

Table 1 below presents the results of the intersection capacity analysis for the existing AM and PM peak hours of operation. As shown in the table, the intersection is currently operating at an overall LOS C in the AM and LOS D in the PM.

Table 1
Existing Conditions
Peak Period Intersection Level of Service and Delay (AM / PM Peak)

Intersection	AM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	C	22.9

Intersection	PM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	D	37.0

Notes:
(1) Total delay is being expressed as seconds per vehicle.

As shown in the table, the intersection is operating at an overall LOS C during the AM peak traffic hour and a LOS D during the weekday PM peak hour traffic. It should be noted that the westbound left-turn movement on Garrisonville Road is calculated to operate at LOS F with 95.6 seconds of average delay per vehicle during the PM peak hour. This is verified through observations at this intersection that revealed queues of over 20 vehicles in the left-turn bay, occasionally extending beyond the storage area and blocking traffic in the through lane. This is due to a very high volume of left-turning traffic (647 veh/hr) in a single left-turn lane, most likely commuter traffic returning from the I-95 corridor during the PM peak hour. Typically, a single left-turn lane can accommodate up to 300-400 vehicles per hour before experiencing queuing concerns

Projected Traffic

A trip generation analysis was performed to determine the number of new vehicle trips that the site is projected to generate during the weekday AM and PM peak hours. Trip generation rates for the proposed site were based on data published in the *ITE Trip Generation Manual, 7th Edition*. **Table 2** summarizes the results of the trip generation analysis.

Table 2
Trip Generation

Description	ITE Land Use Code	Units/sf	AM Peak Enter	AM Peak Exit	AM Peak Total	PM Peak Enter	PM Peak Exit	PM Peak Total	Daily
Conveniece w/Gas pumps	853	16 pumps	137	137	275	154	154	308	3,080
Fast Food Rest. w/ Drive-Thru	934	2,818 sf	76	73	149	51	47	98	1,398
Pharmacy w/ Drive-Thru	881	13,013 sf	20	15	35	55	57	112	1,147
Office	710	60,000 sf	82	11	93	15	74	89	661
		Total:	**315**	**236**	**552**	**275**	**332**	**607**	**6,286**

It should be noted that all estimates shown in **Table 2** are based on ITE's trip rates, with the exception of the daily traffic volume for the convenience with gas pumps land use. Because ITE's survey sample for daily traffic consists of uses with only 4 pumps (no samples were found to have more or less than 4 pumps), the ITE rates are not accurate to project for a 16 pump use for daily traffic. Therefore, the daily traffic estimated for the convenience use was conservatively calculated by multiplying the highest peak hour by 10, for a total of 3,080 trips per day.

The distribution of site-generated trips onto the roadway network was assigned based on an average of existing AM and PM traffic patterns. The average of the two time periods was used in order to conservatively estimate the amount of traffic that would come from and go to the east of the site, and because the difference in the AM and PM peak hour distributions is not significant enough to result in different recommendations for roadway and access improvements.

In general, 45% of the trips are projected to come from the east of the site on Garrisonville Road, 20% will come from the south on Shelton Shop Road, and 35% will come from the west on Garrisonville Road. Since the trip distribution considers an average of the AM and PM peak hour conditions, it was assumed that the outbound trip distribution would mirror the inbound distribution. This helps the capacity analysis of the traffic signal to be conservative, as it adds 45% of the outbound site trips to the southbound left-turn movement at the traffic signal, which would be one of the critical movements at this intersection. The ITE Trip Generation Manual was also used to determine the inbound and outbound splits for the proposed development, which is 57% entering and 43% exiting in the AM and 45.3% entering and 54.7% exiting in the PM. **Figure 3** illustrates the estimated overall arrival trip distribution pattern for the development. It is assumed for the development that a major access driveway would be aligned with Shelton Shop Road, and that potential additional right-in / right-out driveways may be needed along Garrisonville Road to accommodate the traffic for the separate parcels on site. The peak hour site trip assignments used in the analysis are illustrated in **Figure 4**.

Figure 3
Trip Distribution Pattern

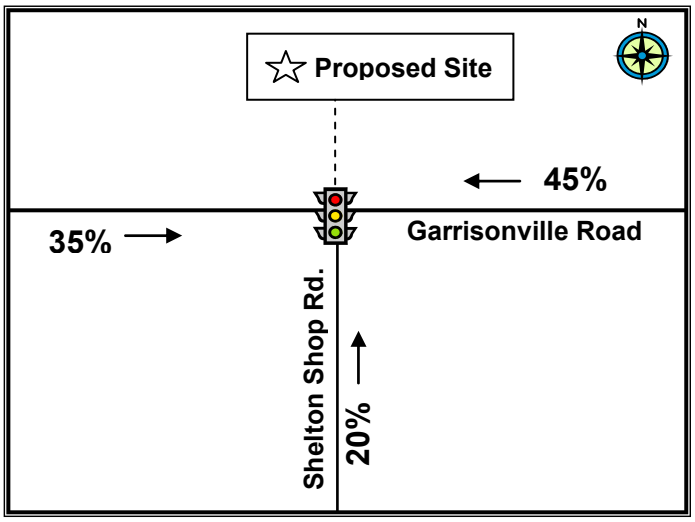
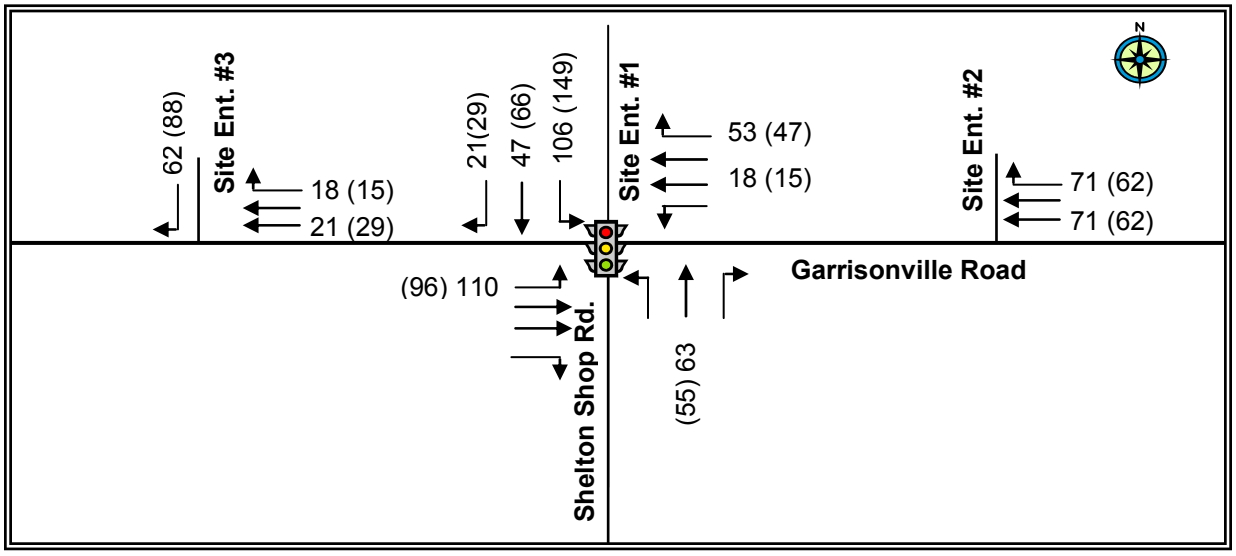


Figure 4
AM (PM) Peak Hour Site Trip Assignment



Future Build Traffic Operational Analysis

The future build traffic operational analysis for the site assesses traffic conditions in the future year of 2007 with the proposed development. To estimate regional growth in traffic volumes, the existing traffic volumes at the intersection of Garrisonville Road and Shelton Shop Road were grown 2% per year for 2 years. It should be noted that VDOT traffic count information shows that the ADT on Garrisonville Road at this location has been constant at 30,000 trips/day for the past 3 years, so this is a conservative estimate of regional growth in this area.

To determine the future traffic in the year 2007 with the proposed development, the trip generation rates shown in Table 2 were superimposed on the network traffic volumes (after regional growth) according to the trip distribution pattern described previously.

Site Access

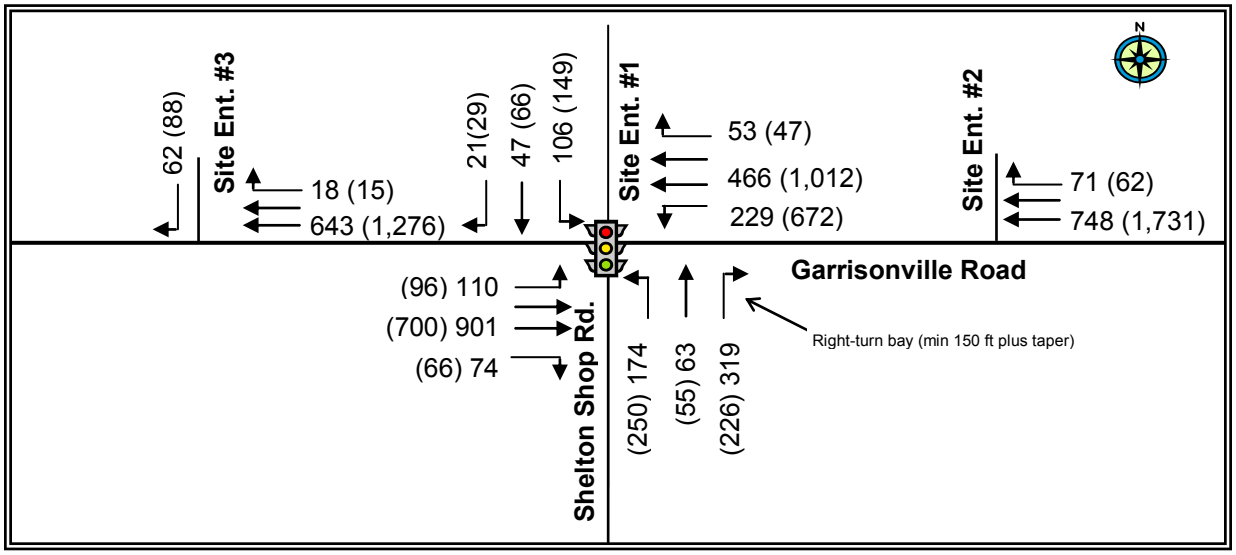
For purposes of analysis, the access for the proposed site was assumed to occur through a main site drive (referred to as Site Entrance 1) to be aligned with Shelton Shop Road, as well as two additional site entrances both to the east and the west of Shelton Shop Road. The two additional site entrances were assumed to be limited to right turns only. These entrances are shown schematically in Figure 4. In order to reduce traffic impacts due to merging and weaving traffic on westbound Garrisonville Road to the east of Shelton Shop Road, it is recommended that the easternmost site entrance (Site Entrance 2) be limited to a right-turn inbound movement only, and would not allow right-turning traffic out of the site. Instead, the merging and weaving concerns for right-turning traffic at this location can be eliminated by requiring the outbound movement to occur through the signalized intersection at Shelton Shop Road. The westernmost site entrance (Site Entrance 3) is recommended to include both right-turns in and out of the site. Both Site Entrances 2 and 3 should be located a minimum of 300 feet from the intersection of Shelton Shop Road in order to provide sufficient spacing for lane-changing and the deceleration and acceleration of vehicles. Due to the high volumes of westbound traffic on Garrisonville Road, all site entrances are recommended to include right-turn deceleration lanes into the site.

Future Build Traffic Volumes and Analysis

The Future Build traffic volumes during the weekday AM and PM peak hours after the development of the proposed site are illustrated in **Figure 5**. These traffic volumes were then analyzed using capacity analysis software to determine the recommended roadway improvements that would be necessary to accommodate the additional traffic generated by the proposed site.

The analysis of the future traffic volumes at the signalized intersection of Garrisonville Road and Shelton Shop Road reveal that the additional traffic generated by the proposed site would cause the intersection to drop from LOS D to LOS F during the PM peak traffic hour without any additional intersection improvements beyond the construction of a three-lane (one lane inbound and two lanes outbound) site access driveway and a westbound right-turn deceleration lane into the main site drive. The capacity analysis reveals that the northbound

Figure 5
Projected Future Build Traffic Volumes and Recommended Lane Usage- AM (PM) Peak Hours



movement into the site would operate at LOS F with the additional site traffic added to the northbound approach traffic. In addition, the westbound left-turn lane would continue to operate at LOS F as it does under existing conditions. Lastly, without changes in the traffic signal phasing, the southbound left-turn out of the site is also projected to operate at LOS F.

According the capacity analysis, the following two improvements are needed in order to reach acceptable LOS at the signalized intersection of Garrisonville Road and Shelton Shop Road. These improvements are illustrated in the general development plan attached at the end of this memorandum:

- The addition of a northbound through lane on the Shelton Shop Road approach to the intersection. This can be achieved by adding an exclusive northbound right-turn bay a minimum 150 feet in length (plus taper) in order to accommodate the projected vehicle queuing in the right-turn lane.

- The modification of the traffic signal to provide for the additional northbound through lane, and a change in signal phasing to provide for protected/permitted left-turn signal phasing for the northbound and southbound approaches.

With the addition of these two public roadway improvements, the following levels of service can be achieved at the signalized intersection, as shown in Table 3. The detailed capacity analysis worksheets for this intersection are provided at the end of this memorandum.

Table 3
Future Build Conditions With Improvements
Peak Period Intersection Level of Service and Delay (AM / PM Peak)

Intersection	AM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	C	26.9

Intersection	PM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	D	53.5

Notes:
(1) Total delay is being expressed as seconds per vehicle.

It should be noted that during the AM peak hour, the overall intersection is projected to continue to operate at LOS C and that all turning movements at the intersection are projected to operate at LOS D or better with the proposed improvements.

During the PM peak hour with the proposed improvements, the westbound left-turn lane on Garrisonville Road is projected to continue to operate at LOS F due the high turning volumes for this movement. It should be noted that this is an existing capacity problem at this intersection and that the proposed development will not add any traffic to this turning movement. It should also be noted that the eastbound left turn movement into the proposed site is projected to operate at LOS E during the PM peak hour. Although this movement is projected to operate at a lower LOS than existing conditions, it should be noted that the 95th percentile queue is projected to extend only 124 feet in a left-turn lane that is currently 150 feet plus taper, and that the volume-to-capacity ratio for this movement is projected to be only 0.78. The low LOS for this movement is therefore a result of the longer cycle length (approx. 135 seconds) used by VDOT at this intersection, and does not indicate a lack of capacity for this movement. All other movements at this intersection are projected to operate at LOS D or better during the PM peak hour with the proposed improvements.

Site Access Recommendations

As a result of the analysis performed for this study, the following access locations and road improvements are recommended as a part of the proposed development. These access locations and recommended road improvements are illustrated in the general development plan attached at the end of this memorandum:

- Construct a right-in only access driveway located approximately 300 feet east of the signalized intersection of Garrisonville Road and Shelton Shop Road.

- Construct a full-access driveway at the signalized intersection of Garrisonville Road and Shelton Shop Road. The new southbound approach should include an exclusive left-turn lane, right-turn lane and through lane. The northbound Shelton Shop Road approach to the intersection should be modified to include a new northbound through lane into the proposed site by constructing a new exclusive right-turn bay for a length of a minimum of 150 feet. These roadway improvements may also require modification of the traffic signal equipment.

- A right-in/out driveway on Garrisonville Road to be located approximately 300 feet west of the Shelton Shop Road intersection.

With the access locations and roadway improvements associated with the site as described above, the intersection of Garrisonville Road and Shelton Shop Road is projected to continue to operate at an overall LOS C and D during the weekday AM and PM Peak hours, respectively.

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Parking Summary Chart

Description	Required	Provided
PHARMACY STORE	52	67
FAST FOOD RESTAURANT	43	45
FUEL CENTER / RETAIL	19	52
OFFICE	179	180
TOTAL SPACES	293	344

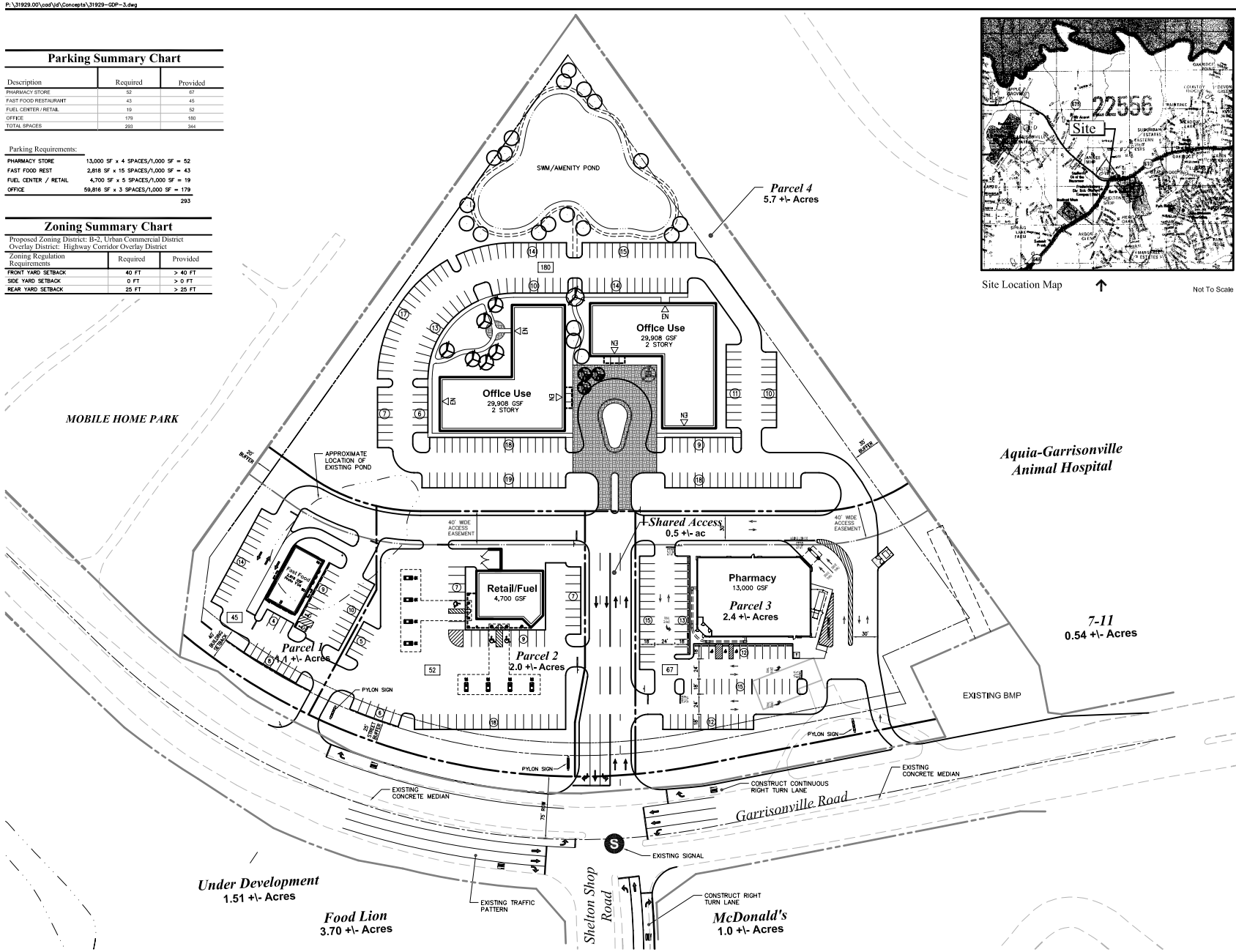
Parking Requirements:

PHARMACY STORE	13,000 SF x 4 SPACES/1,000 SF = 52
FAST FOOD REST	2,818 SF x 15 SPACES/1,000 SF = 43
FUEL CENTER / RETAIL	4,700 SF x 5 SPACES/1,000 SF = 19
OFFICE	59,816 SF x 3 SPACES/1,000 SF = 179
	293

Zoning Summary Chart

Proposed Zoning District: B-2, Urban Commercial District
Overlay District: Highway Corridor Overlay District

Zoning Regulation Requirements	Required	Provided
FRONT YARD SETBACK	40 FT	> 40 FT
SIDE YARD SETBACK	0 FT	> 0 FT
REAR YARD SETBACK	25 FT	> 25 FT



Site Location Map

Not To Scale

VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
115 South 15th Street, Suite 200
Richmond, Virginia 23219
804-343-7100 • FAX 804-343-1713

MID-ATLANTIC
commercial properties
401 East Las Olas Boulevard • Suite 1000, Fort Lauderdale, FL 33301
954.522.6010 • Fax 954.522.6056

N

50 0 50 100
SCALE IN FEET

No.	Revision	Date	Apprvd.

Designed by DZ | Drawn by DZ | Checked by RSC
CAD checked by | Approved by
Scale 1"=50' | Date February 17, 2006

Project Title
Mixed Use Development
Garrisonville Rd and Shelton Shop Rd
Rock Hill Magisterial District
Stafford County, Virginia

Issued for
Rezoning and CUP
of Tax Map 19-71

Not Approved for Construction

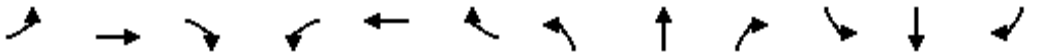
Drawing Title
General
Development
Plan

Drawing Number
GDP

Sheet 1 of 1

Project Number
31929

31929-GDP-3.DWG

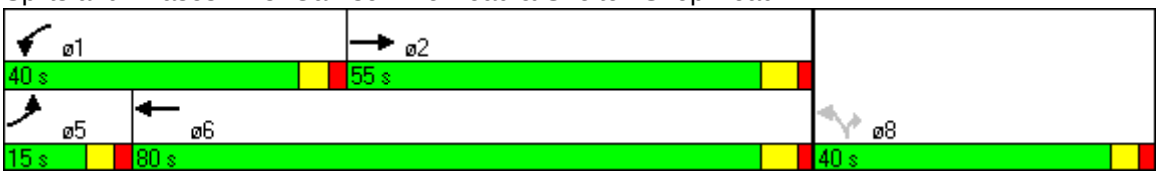


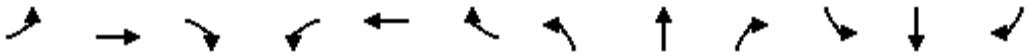
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50		50			
Trailing Detector (ft)	0	0	0	0	0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected				0.950			0.950					
Satd. Flow (prot)	1863	3223	1205	1719	2959	0	1517	0	1583	0	0	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	1863	3223	1205	1719	2959	0	1517	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88						327			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		2765			2765			2449			2244	
Travel Time (s)		41.9			41.9			47.7			51.0	
Volume (vph)	0	867	71	221	431	0	167	0	307	0	0	0
Peak Hour Factor	0.92	0.91	0.81	0.92	0.88	0.92	0.77	0.92	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	2%	12%	34%	5%	22%	2%	19%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	953	88	240	490	0	217	0	327	0	0	0
Lane Group Flow (vph)	0	953	88	240	490	0	217	0	327	0	0	0
Turn Type	Prot		Free	Prot			custom		custom			
Protected Phases	5	2		1	6							
Permitted Phases			Free				8		8			
Detector Phases	5	2		1	6		8		8			
Minimum Initial (s)	5.0	12.0		5.0	12.0		6.0		6.0			
Minimum Split (s)	10.5	18.5		10.5	18.5		11.5		11.5			
Total Split (s)	15.0	55.0	0.0	40.0	80.0	0.0	40.0	0.0	40.0	0.0	0.0	0.0
Total Split (%)	11.1%	40.7%	0.0%	29.6%	59.3%	0.0%	29.6%	0.0%	29.6%	0.0%	0.0%	0.0%
Maximum Green (s)	9.5	48.5		34.5	73.5		34.5		34.5			
Yellow Time (s)	3.5	4.5		3.5	4.5		3.5		3.5			
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0		2.0			
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0		4.0			
Recall Mode	None	None		None	None		None		None			
Act Effct Green (s)		35.6	89.4	19.2	59.4		21.0		21.0			
Actuated g/C Ratio		0.40	1.00	0.21	0.66		0.23		0.23			
v/c Ratio		0.74	0.07	0.65	0.25		0.61		0.53			
Control Delay		28.9	0.1	44.6	6.8		42.1		7.3			
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0			
Total Delay		28.9	0.1	44.6	6.8		42.1		7.3			
LOS		C	A	D	A		D		A			
Approach Delay		26.5			19.3							
Approach LOS		C			B							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		226	0	122	49		107		0			
Queue Length 95th (ft)		454	0	270	104		200		74			
Internal Link Dist (ft)		2685			2685			2369			2164	
Turn Bay Length (ft)			500	300								
Base Capacity (vph)		1617	1205	612	2163		548		781			
Starvation Cap Reductn		0	0	0	0		0		0			
Spillback Cap Reductn		0	0	0	0		0		0			
Storage Cap Reductn		0	0	0	0		0		0			
Reduced v/c Ratio		0.59	0.07	0.39	0.23		0.40		0.42			

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 89.4	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 22.9	Intersection LOS: C
Intersection Capacity Utilization 55.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Garrisonville Road & Shelton Shop Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50		50			
Trailing Detector (ft)	0	0	0	0	0		0		0			
Turning Speed (mph)	15		9	25		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected	0.950			*0.950			0.950					
Satd. Flow (prot)	1805	3574	1615	1805	3574	0	1736	0	1615	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1805	3574	1615	1805	3574	0	1736	0	1615	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			117						252			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		2765			2765			2449			2244	
Travel Time (s)		41.9			41.9			47.7			51.0	
Volume (vph)	2	674	63	647	959	0	240	0	217	0	0	0
Peak Hour Factor	0.50	0.94	0.54	0.90	0.96	0.92	0.91	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	2%	0%	2%	2%	2%
Adj. Flow (vph)	4	717	117	719	999	0	264	0	252	0	0	0
Lane Group Flow (vph)	4	717	117	719	999	0	264	0	252	0	0	0
Turn Type	Prot		Free	Prot			custom		custom			
Protected Phases	1	6		5	2							
Permitted Phases			Free				4		4			
Detector Phases	1	6		5	2		4		4			
Minimum Initial (s)	5.0	12.0		5.0	12.0		6.0		6.0			
Minimum Split (s)	10.5	18.5		10.5	18.5		11.5		11.5			
Total Split (s)	10.5	64.0	0.0	40.0	93.5	0.0	31.0	0.0	31.0	0.0	0.0	0.0
Total Split (%)	7.8%	47.4%	0.0%	29.6%	69.3%	0.0%	23.0%	0.0%	23.0%	0.0%	0.0%	0.0%
Maximum Green (s)	5.0	57.5		34.5	87.0		25.5		25.5			
Yellow Time (s)	3.5	4.5		3.5	4.5		3.5		3.5			
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0		2.0			
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0		4.0			
Recall Mode	None	None		None	None		None		None			
Act Effct Green (s)	6.6	29.3	100.1	36.5	68.1		22.1		22.1			
Actuated g/C Ratio	0.06	0.29	1.00	0.36	0.68		0.22		0.22			
v/c Ratio	0.04	0.68	0.07	1.09	0.41		0.69		0.46			
Control Delay	52.5	32.3	0.1	95.6	8.6		42.7		6.7			
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0			
Total Delay	52.5	32.3	0.1	95.6	8.6		42.7		6.7			
LOS	D	C	A	F	A		D		A			
Approach Delay		27.9			45.0							
Approach LOS		C			D							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	3	217	0	~553	133		156		0			
Queue Length 95th (ft)	8	288	0	#898	248		268		54			
Internal Link Dist (ft)		2685			2685			2369			2164	
Turn Bay Length (ft)	150		500	300								
Base Capacity (vph)	109	1648	1615	659	2634		449		605			
Starvation Cap Reductn	0	0	0	0	0		0		0			
Spillback Cap Reductn	0	0	0	0	0		0		0			
Storage Cap Reductn	0	0	0	0	0		0		0			
Reduced v/c Ratio	0.04	0.44	0.07	1.09	0.38		0.59		0.42			

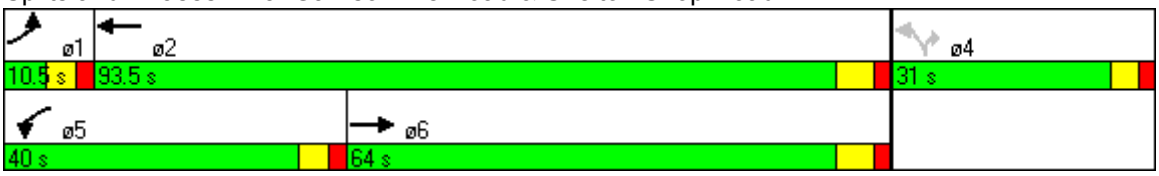
Intersection Summary			
Area Type:	Other		
Cycle Length: 135			
Actuated Cycle Length: 100.1			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 37.0		Intersection LOS: D	
Intersection Capacity Utilization 77.8%		ICU Level of Service D	
Analysis Period (min) 15			

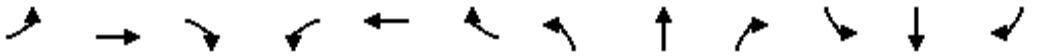
* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Garrisonville Road & Shelton Shop Road





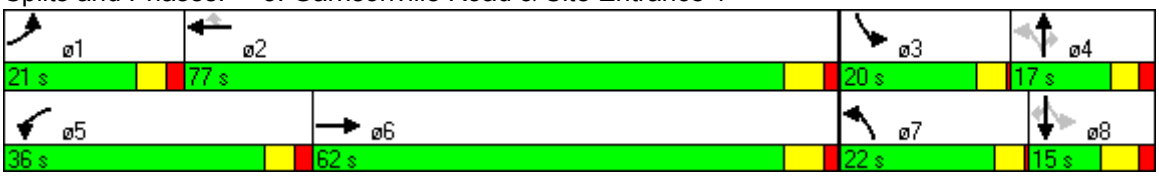
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		1	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	25		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			*0.950			0.950			0.950		
Satd. Flow (prot)	1805	3574	1615	1805	3574	1615	1736	1863	1615	1770	1863	1583
Flt Permitted	0.950			0.950			0.612			0.713		
Satd. Flow (perm)	1805	3574	1615	1805	3574	1615	1118	1863	1615	1328	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			58			371			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		1270			1610			2444			1996	
Travel Time (s)		19.2			24.4			47.6			45.4	
Volume (vph)	110	901	74	229	466	53	174	63	319	106	47	21
Peak Hour Factor	0.50	0.94	0.54	0.90	0.96	0.92	0.91	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	2%	0%	2%	2%	2%
Adj. Flow (vph)	220	959	137	254	485	58	191	68	371	115	51	23
Lane Group Flow (vph)	220	959	137	254	485	58	191	68	371	115	51	23
Turn Type	Prot		Free	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			Free			2	4		4	8		8
Detector Phases	1	6		5	2	2	7	4	4	3	8	8
Minimum Initial (s)	5.0	12.0		5.0	12.0	12.0	4.0	4.5	4.5	4.0	3.5	3.5
Minimum Split (s)	10.5	18.5		10.5	18.5	18.5	8.0	10.0	10.0	8.0	10.0	10.0
Total Split (s)	21.0	62.0	0.0	36.0	77.0	77.0	22.0	17.0	17.0	20.0	15.0	15.0
Total Split (%)	15.6%	45.9%	0.0%	26.7%	57.0%	57.0%	16.3%	12.6%	12.6%	14.8%	11.1%	11.1%
Maximum Green (s)	15.5	55.5		30.5	70.5	70.5	18.0	11.5	11.5	16.0	8.5	8.5
Yellow Time (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5	3.5	3.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	17.9	36.5	94.5	20.0	38.6	38.6	24.1	13.2	13.2	17.1	11.3	11.3
Actuated g/C Ratio	0.19	0.39	1.00	0.21	0.41	0.41	0.25	0.14	0.14	0.18	0.12	0.12
v/c Ratio	0.65	0.69	0.08	0.66	0.33	0.08	0.50	0.26	0.68	0.41	0.24	0.11
Control Delay	51.6	27.2	0.1	40.6	18.6	4.2	36.6	47.7	11.5	36.2	51.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.6	27.2	0.1	40.6	18.6	4.2	36.6	47.7	11.5	36.2	51.6	21.1
LOS	D	C	A	D	B	A	D	D	B	D	D	C
Approach Delay		28.4			24.6			23.0			38.5	
Approach LOS		C			C			C			D	

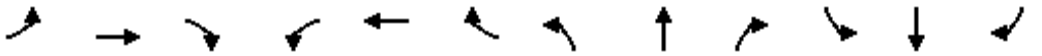
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	132	268	0	148	107	0	94	38	0	54	30	0
Queue Length 95th (ft)	144	414	0	283	150	22	212	104	77	133	85	28
Internal Link Dist (ft)		1190			1530			2364			1916	
Turn Bay Length (ft)	150		500	300								
Base Capacity (vph)	357	1832	1615	570	2076	963	423	297	570	368	232	218
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.52	0.08	0.45	0.23	0.06	0.45	0.23	0.65	0.31	0.22	0.11

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 94.5	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 63.9%	ICU Level of Service B
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Garrisonville Road & Site Entrance 1





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		1	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	25		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			*0.950			0.950			0.950		
Satd. Flow (prot)	1805	3574	1615	1805	3574	1615	1736	1863	1615	1770	1863	1583
Flt Permitted	0.950			0.950			0.708			0.656		
Satd. Flow (perm)	1805	3574	1615	1805	3574	1615	1293	1863	1615	1222	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			122			51			263			32
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		1270			1610			2444			1996	
Travel Time (s)		19.2			24.4			47.6			45.4	
Volume (vph)	96	700	66	672	1012	47	250	55	226	149	66	29
Peak Hour Factor	0.50	0.94	0.54	0.90	0.96	0.92	0.91	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	2%	0%	2%	2%	2%
Adj. Flow (vph)	192	745	122	747	1054	51	275	60	263	162	72	32
Lane Group Flow (vph)	192	745	122	747	1054	51	275	60	263	162	72	32
Turn Type	Prot		Free	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			Free			2	4		4	8		8
Detector Phases	1	6		5	2	2	7	4	4	3	8	8
Minimum Initial (s)	5.0	12.0		5.0	12.0	12.0	4.0	6.0	6.0	4.0	12.0	12.0
Minimum Split (s)	10.5	18.5		10.5	18.5	18.5	8.0	11.5	11.5	8.0	18.5	18.5
Total Split (s)	20.0	56.0	0.0	43.0	79.0	79.0	18.0	17.0	17.0	19.0	18.0	18.0
Total Split (%)	14.8%	41.5%	0.0%	31.9%	58.5%	58.5%	13.3%	12.6%	12.6%	14.1%	13.3%	13.3%
Maximum Green (s)	14.5	49.5		37.5	72.5	72.5	14.0	11.5	11.5	15.0	11.5	11.5
Yellow Time (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5	3.5	3.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	15.6	33.2	114.3	39.4	57.0	57.0	26.6	12.8	12.8	23.5	14.0	14.0
Actuated g/C Ratio	0.14	0.29	1.00	0.34	0.50	0.50	0.23	0.11	0.11	0.21	0.12	0.12
v/c Ratio	0.78	0.72	0.08	1.20	0.59	0.06	0.76	0.29	0.64	0.52	0.32	0.15
Control Delay	68.9	37.8	0.1	140.3	21.8	4.2	54.0	52.7	13.0	41.5	53.5	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.9	37.8	0.1	140.3	21.8	4.2	54.0	52.7	13.0	41.5	53.5	18.0
LOS	E	D	A	F	C	A	D	D	B	D	D	B
Approach Delay		39.1			69.1			35.9			41.9	
Approach LOS		D			E			D			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	142	264	0	~702	294	0	180	42	0	98	51	0
Queue Length 95th (ft)	124	331	0	#1032	358	20	#352	91	68	176	105	32
Internal Link Dist (ft)		1190			1530			2364			1916	
Turn Bay Length (ft)	150		500	300								
Base Capacity (vph)	254	1402	1615	622	2031	940	362	226	427	343	222	216
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.53	0.08	1.20	0.52	0.05	0.76	0.27	0.62	0.47	0.32	0.15

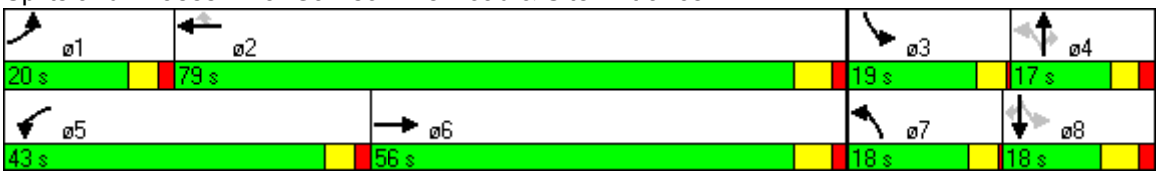
Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 114.3	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.20	
Intersection Signal Delay: 53.5	Intersection LOS: D
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Garrisonville Road & Site Entrance 1

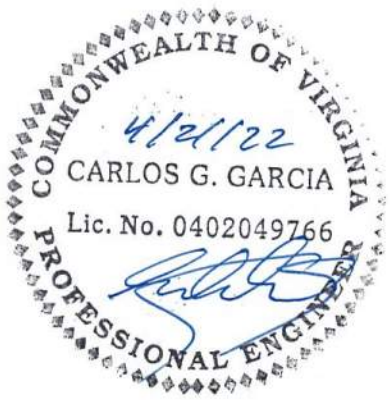


Bowman

Appendix C
Trip Generation Comparison Evaluation

Bowman

Memorandum



To: Mr. Scott Friedman / VP Project Management
The Morgan Companies

CC:

From: Carlos G. Garcia, P.E.

Date: 4/21/2022

Re: Trip Generation Comparison – Existing Retail Development at Garrisonville Road and Shelton Shop Road

---

As requested, Bowman has prepared a trip generation comparison between the approved 2006 Traffic Study prepared for the Retail Development at Garrisonville Road/Shelton Shop Road and the existing land uses of the site plus the addition of the proposed Chick-fil-A Store.

The purpose of this memorandum is to determine if the trip generation pertinent to the existing and proposed land uses exceed the trip generation threshold established by the approved 2006 traffic study.

Background Information

The existing Retail Development is located on the northern side of the intersection of Garrisonville Road and Shelton Shop Road. The development currently has the following established and operational land uses:

- 7-Eleven Convenience Store with 16 Gas pumps
- 13,013 SF CVS Pharmacy with a drive-thru
- 105,350 SF Mini-Warehouse (Existing Stafford Storage Facility)
- Vacant lot

It is our understanding that a proposed 5,236 SF Chick-fil-A Store with a drive-thru is planned to be developed on the available vacant lot of the site.

The site location is depicted on **Figure 1**.

Figure 1. Site Location

As shown in **Figure 1**, access to the site is provided via one (1) Right-In only driveway accessing the CVS Store, a signalized intersection that provides full access to the full development from Shelton Road and a right-in/right-out driveway that provides access to both the 7-Eleven Convenience Store and the vacant lot.

The conceptual plan for the proposed Chick-fil-A Store is displayed on **Figure 2** and contained in **Attachment A** to this memorandum.

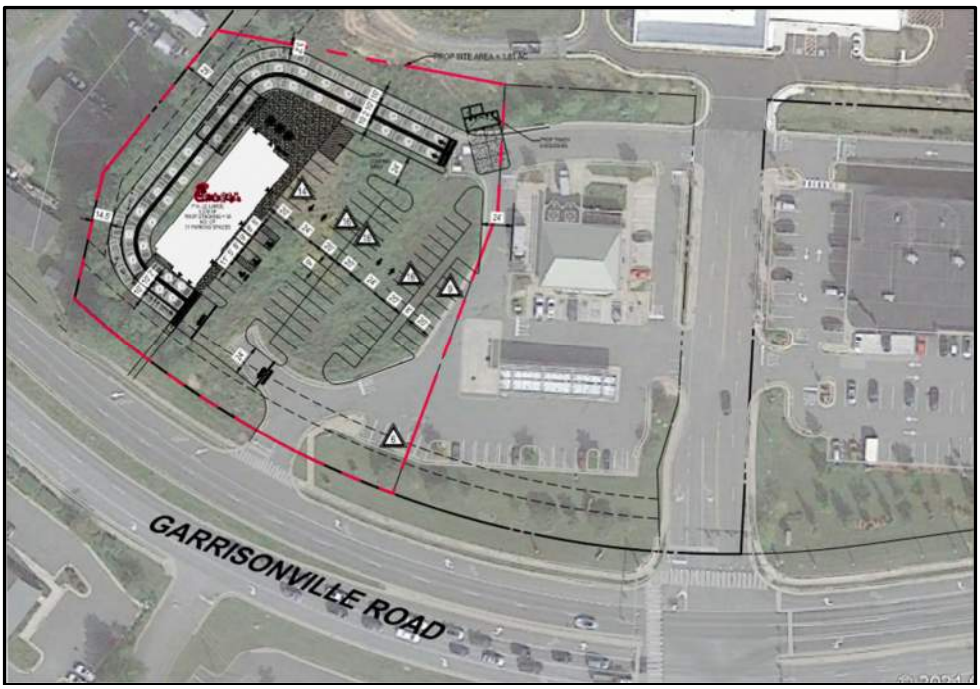


Figure 2. Conceptual Plan

The overall existing Retail Development was approved in 2006; and a traffic impact study supporting the development was also prepared on February 17, 2006, by Vanasse Hangen Brustlin, Inc. The approved traffic study for the site included the following land uses:

- Convenience Store with 16 gas pumps
- 2,818 SF Fast Food Restaurant w/Drive-thru
- 13,013 SF Pharmacy w/Drive-thru
- 60,000 SF Office

The Traffic Study recommended roadway improvements necessary to mitigate the traffic impact of the Retail Development on Garrisonville Road. These recommended roadway improvements were constructed as part of the plan development. Please note that the Office land use was never developed and was replaced with the Mini-Warehouse Facility (Stafford Storage).

As previously discussed, the purpose of this memorandum is to determine if the trip generation pertinent to the existing and proposed land uses exceed the trip generation threshold established by the approved 2006 traffic study.

The results of the trip generation comparison will also determine if additional studies or mitigation improvements would be required if additional trips are added to the existing roadway network.

Trip Generation Comparison

Bowman prepared trip generation tables for an average weekday, morning peak hour and evening peak hour periods. The trip generation was completed for both the land uses contained in the approved 2006 traffic study as well as the existing land uses including the proposed Chick-fil-A Store.

The Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* was used to determine the number of trips generated by the proposed land uses. The pass-by rates were also obtained directly from the appendix from the ITE *Trip Generation Manual, 11th Edition*.

Trip Generation Comparison – AM Peak Hour

The results of the trip generation comparison indicate that the existing land uses of the retail development would generate an additional 9 total trips during the morning peak hour. However, after considering pass by trips, the development is expected to generate approximately 45 fewer primary trips during the morning peak hour than the trips forecasted in the approved 2006 Traffic Study. Please note that there are three (3) driveways servicing the site.

Trip Generation (Per ITE Trip Generation Manual - 11th Edition) - Land Uses from approved 2006 Traffic Study

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday AM Peak Hour												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP	216	217	433	162	163	325	54	54	108
Fast Food Restaurant w/Drive-thru	934	2,818	SF	64	61	125	32	31	63	32	31	63
Pharmacy w/Drive-thru	881	13,013	SF	25	24	49	12	12	24	13	12	25
Office	710	60,000	SF	95	13	108				95	13	108
Total, AM Peak Hour				**400**	**315**	**715**	**206**	**205**	**411**	**194**	**110**	**304**

Trip Generation (Per ITE Trip Generation Manual - 11th Edition) - **Existing Land Uses and proposed Chick-Fil-A Store**

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday AM Peak Hour												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP	216	217	433	162	163	325	54	54	108
Fast Food Restaurant w/Drive-thru	934	5,236	SF	119	114	233	60	57	117	60	57	117
Pharmacy w/Drive-thru	881	13,013	SF	25	24	49	12	12	24	13	12	25
Mini-Warehouse (Existing Stafford Storage Facility)	151	105,350	SF	5	4	9				5	4	9
Total, AM Peak Hour				**365**	**359**	**724**	**234**	**232**	**465**	**131**	**127**	**259**

Trip Generation Difference

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday AM Peak Hour												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP									
Fast Food Restaurant w/Drive-thru	934	5,236	SF	+55	+53	+108				+28	+26	+54
Pharmacy w/Drive-thru	881	13,013	SF									
Mini-Warehouse (Existing Stafford Storage Facility)	151	105,350	SF	-90	-9	-99				-90	-9	-99
DELTA				-35	+44	+9				-62	+17	-45

Trip Generation Comparison – PM Peak Hour

The results of the trip generation comparison indicate that the existing land uses of the retail development would generate approximately 13 fewer total trips during the evening peak hour. However, after considering pass by trips, the development is expected to generate approximately 57 fewer primary trips during the evening peak hour than the trips forecasted in the approved 2006 Traffic Study. Please note that there are three (3) driveways servicing the site.

Trip Generation (Per ITE Trip Generation Manual - 11th Edition) - Land Uses from approved 2006 Traffic Study

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday PM Peak Hour												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP	182	182	364	137	137	273	46	46	91
Fast Food Restaurant w/Drive-thru	934	2,818	SF	48	45	93	26	25	51	22	20	42
Pharmacy w/Drive-thru	881	13,013	SF	66	67	133	32	33	65	34	34	68
Office	710	60,000	SF	18	91	109				18	91	109
Total, PM Peak Hour				**314**	**385**	**699**	**195**	**194**	**389**	**119**	**191**	**310**

Trip Generation (Per ITE Trip Generation Manual - 11th Edition) - **Existing Land Uses and proposed Chick-Fil-A Store**

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday PM Peak Hour												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP	182	182	364	137	137	273	46	46	91
Fast Food Restaurant w/Drive-thru	934	5,236	SF	90	83	173	50	46	95	41	37	78
Pharmacy w/Drive-thru	881	13,013	SF	66	67	133	32	33	65	34	34	68
Mini-Warehouse (Existing Stafford Storage Facility)	151	105,350	SF	7	9	16				7	9	16
Total, PM Peak Hour				**345**	**341**	**686**	**218**	**215**	**433**	**127**	**126**	**253**

Trip Generation (Per ITE Trip Generation Manual - 11th Edition)

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Weekday PM Peak Hour												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP									
Fast Food Restaurant w/Drive-thru	934	5,236	SF	+42	+38	+80				+19	+17	+36
Pharmacy w/Drive-thru	881	13,013	SF									
Mini-Warehouse (Existing Stafford Storage Facility)	151	105,350	SF	-11	-82	-93				-11	-82	-93
DELTA				+31	-44	-13				+8	-65	-57

Trip Generation Comparison – Average Weekday

The results of the trip generation comparison indicate that the existing land uses of the retail development would generate approximately 540 additional trips during an average weekday. However, after considering pass by trips, the development is expected to generate approximately 26 fewer primary trips during an average weekday than the trips forecasted in the approved 2006 Traffic Study. Please note that there are three (3) driveways servicing the site.

Trip Generation (Per ITE Trip Generation Manual - 11th Edition) - Land Uses from approved 2006 Traffic Study

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Average Weekday												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP	2,057	2,057	4,114	1,543	1,543	3,086	514	514	1,029
Fast Food Restaurant w/Drive-thru	934	2,818	SF	657	657	1,314	329	329	657	329	329	657
Pharmacy w/Drive-thru	881	13,013	SF	662	663	1,365	324	325	669	338	338	696
Office	710	60,000	SF	372	372	744				372	372	744
Total, Average Weekday				**3,748**	**3,749**	**7,537**	**2,196**	**2,196**	**4,411**	**1,552**	**1,553**	**3,126**

Trip Generation (Per ITE Trip Generation Manual - 11th Edition) - **Existing Land Uses and proposed Chick-Fil-A Store**

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Average Weekday												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP	2,057	2,057	4,114	1,543	1,543	3,086	514	514	1,029
Fast Food Restaurant w/Drive-thru	934	5,236	SF	1,222	1,223	2,445	611	612	1,223	611	612	1,223
Pharmacy w/Drive-thru	881	13,013	SF	662	663	1,365	324	325	669	338	338	696
Mini-Warehouse (Existing Stafford Storage Facility)	151	105,350	SF	76	77	153				76	77	153
Total, Average Weekday				**4,017**	**4,020**	**8,077**	**2,478**	**2,479**	**4,977**	**1,539**	**1,541**	**3,100**

Trip Generation (Per ITE Trip Generation Manual - 11th Edition)

Development	Land Use	Size	Units	Total Trips			Pass-By Trips			Primary Trips		
				In	Out	Total	In	Out	Total	In	Out	Total
Average Weekday												
Convenience Store/Gas Station (16 Pumps)	945	4,700/16	SF / VFP									
Fast Food Restaurant w/Drive-thru	934	5,236	SF	+565	+566	+1131				+282	+283	+566
Pharmacy w/Drive-thru	881	13,013	SF									
Mini-Warehouse (Existing Stafford Storage Facility)	151	105,350	SF	-296	-295	-591				-296	-295	-591
DELTA				+269	+271	+540				-14	-12	-26

Conclusions

The results of the trip generation comparison indicate that the existing land uses of the retail development and the proposed Chick-fil-A store are expected to generate fewer primary trips that forecasted in the approved 2006 Traffic Study.

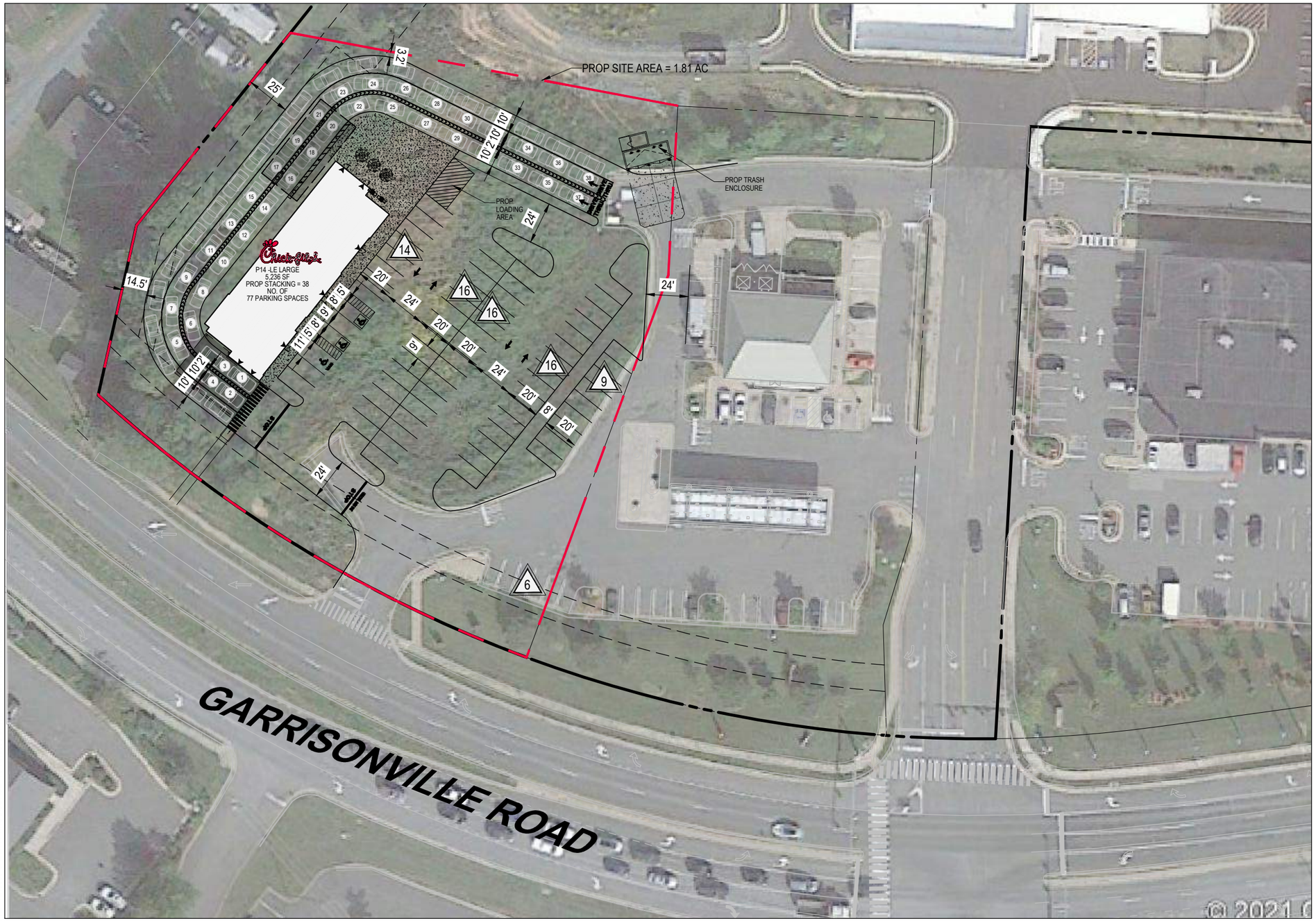
Additionally, the results of the trip generation comparison indicate that the existing land uses of the retail development and the proposed Chick-fil-A store are expected to generate fewer total trips during the evening peak hour. Additional total trips are expected during the morning peak hour and during an average weekday. These trips will be distributed amongst the three existing driveways.

The trip generation comparison results also indicate that the mitigation improvements already constructed for the Retail Development would also be sufficient to accommodate the existing land uses of the Retail Development and the proposed Chick-fil-A store.

The preparation of additional traffic studies does not seem to be necessary since the existing land uses of the retail development and the proposed Chick-fil-A store are expected to generate fewer primary trips than forecasted in the approved 2006 Traffic Study

ATTACHMENT A:

CONCEPTUAL PLAN



CONCEPT PLAN NOTES

1. THIS CONCEPT WAS PREPARED BASED UPON A CAD FILE FROM THE BROKER ENTITLED "PLAT -6-5-18".

2. THE CONCEPT REPRESENTED HEREIN IDENTIFIES A DESIGN CONCEPT RESULTING SOLELY FROM LAYOUT PREFERENCES AND GUIDANCE DICTATED AND IDENTIFIED SOLELY BY THE CLIENT. THE FEASIBILITY WITH RESPECT TO OBTAINING LOCAL, COUNTY, STATE, AND OTHER APPLICABLE APPROVALS IS NOT WARRANTED, AND CAN ONLY BE ASSESSED AFTER FURTHER EXAMINATION AND VERIFICATION OF APPLICABLE REQUIREMENTS AND THE PROCUREMENT OF ALL NECESSARY JURISDICTIONAL APPROVALS.

3. THIS CONCEPTUAL PLAN IS PREPARED FOR CONCEPTUAL PRESENTATION PURPOSES, ONLY, AND IS NOT INTENDED TO AND SHOULD NOT BE UTILIZED AS A ZONING AND CONSTRUCTION DOCUMENT. THE EXISTING CONDITIONS SHOWN HEREON ARE BASED UPON INFORMATION THAT WAS SUPPLIED TO THE ENGINEER BY THE OWNER AND OTHERS NOT UNDER ENGINEER'S CONTROL, AT THE TIME OF PLAN PREPARATION AND MAY BE SUBJECT TO CHANGE UPON PERFORMANCE OF ADDITIONAL DUE DILIGENCE AND/OR FIELD SURVEY.

PARKING TABULATION

REQUIRED PARKING: 58 (11 SPACE PER 1000 SF)

BUILDING AREA: 5,236 SF

PROPOSED PARKING: 77 SPACES

PROPOSED STACKING: 38 SPACES

H:\21\V216509\CAD\DRAWINGS\CONCEPTS\V216509-CPTA4----->LAYOUT: CONCEPT

BOHLER //
28 BLACKWELL PARK LANE, SUITE 201
WARRENTON, VIRGINIA 20186
Phone: (540) 349-4500
Fax: (540) 349-0321
VA@BohlerEng.com

CHICK-FIL-A GARRISONVILLE - CONCEPT A-1

STAFFORD COUNTY, VIRGINIA 22556

60 30 15 0 60
1"= 60'

ATTACHMENT B:

APPROVED 2006 TRAFFIC STUDY

Transportation
Land Development
Environmental
Services

Vanasse Hangen Brustlin, Inc.

115 South 15th Street, Suite 200
Richmond, Virginia 23219-4209
804.343.7100
FAX 804.343.1713

Memorandum

To: Trey Morgan, Morgan Property Group

Date: February 17, 2006

Project No.: 31929.00

From: David P. Beardsley, P.E.

Re: Traffic Study - Proposed Retail Development at Garrisonville Road and Shelton Shop Road - REVISED

VHB has been tasked with performing a traffic assessment to determine the traffic and access impacts of a retail development planned for construction at the intersection of Garrisonville Road (Route 610) and Shelton Shop Road (Route 648) in Stafford, Virginia. The site location is illustrated in **Figure 1**.

The traffic issues addressed in this study include:

- Existing traffic conditions at the site during the weekday AM and PM peak hours of operation.
- Traffic conditions after the opening of the proposed development during the weekday AM and PM peak hours of operation.
- Recommended access improvements needed to accommodate proposed site traffic in close proximity to the intersection of Garrisonville Road and Shelton Shop Road.

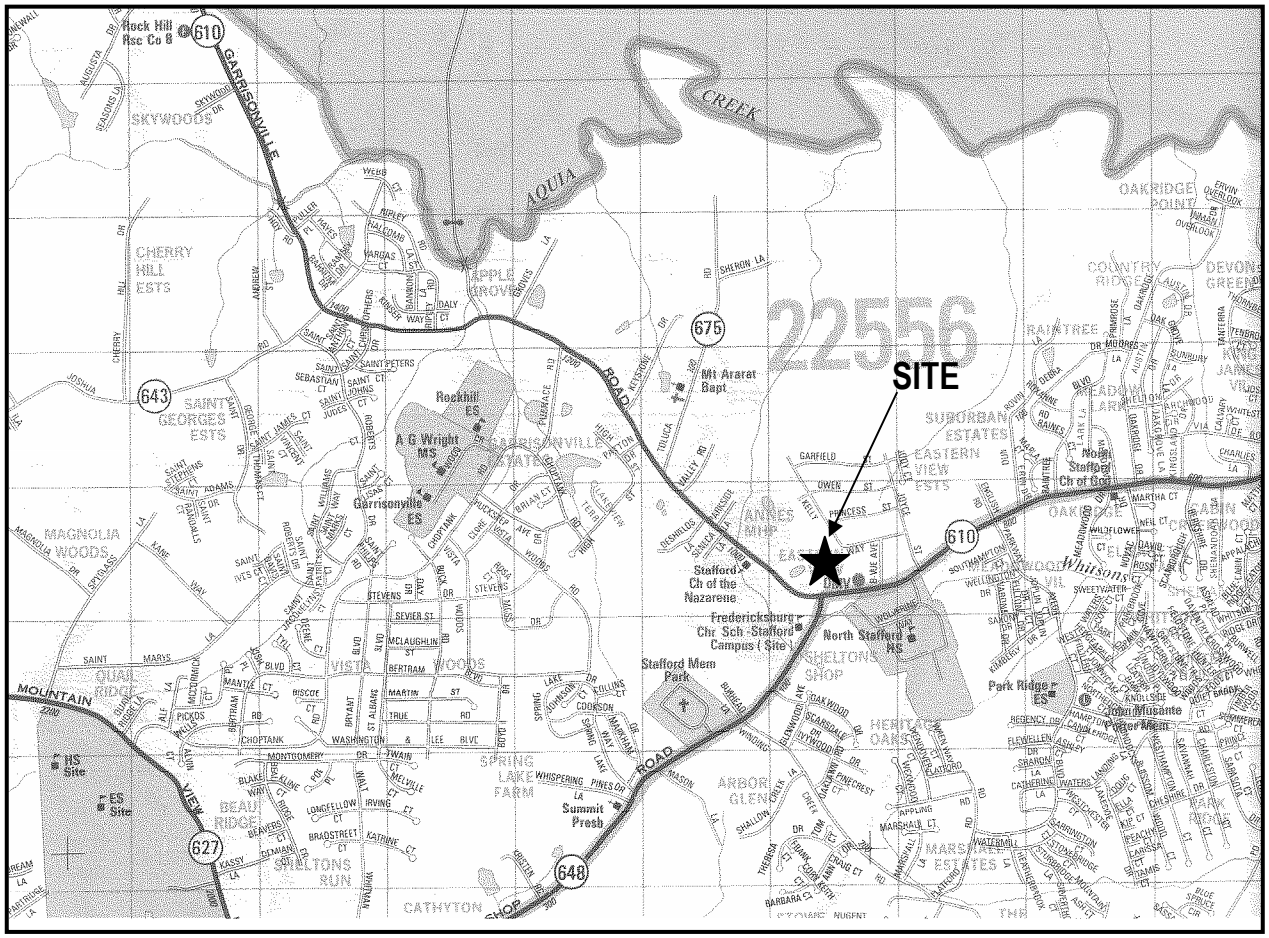
The proposed development is assumed to consist of a 13,000 s.f. pharmacy with drive-through, a convenience store with 16 gas pumps, a 2,818 s.f. fast food restaurant with drive-through, and a 60,000 s.f. general office. The proposed site plan is attached at the end of this memorandum.

Data Collection

Average Daily Traffic (ADT) Count Data

Documentation of existing traffic conditions throughout the project area consisted of the determination of Average Daily Traffic (ADT) volumes on the roadways surrounding the site, which were obtained from VDOT. The primary roads adjacent to the proposed development are Garrisonville Road and Shelton Shop Road. Garrisonville Road has an average daily traffic (ADT) volume of 18,000 vehicles per day west of Shelton Shop Road and 30,000 vehicles per day east of Shelton Shop Road. Shelton Shop Road carries of volume of 9,700 vehicles per day just south of Garrisonville Road.

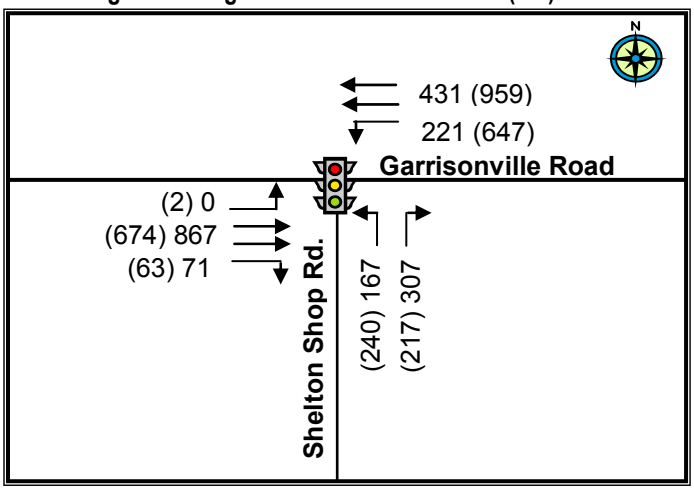
Figure 1
Site Location



Peak Hour Intersection Count Data

Intersection turning movement counts were also performed during typical weekday AM and PM peak traffic periods on Wednesday, October 19, 2005. The breakdown of the count data revealed that the weekday peak hours of operation are 7:00 AM to 8:00 AM and 5:00 PM to 6:00 PM. The existing peak hour volumes and lane usage at the intersection of Garrisonville Road and Shelton Shop Road are shown in **Figure 2**.

Figure 2
Existing Lane Usage and Traffic Counts - AM (PM) Peak Hours



Existing Traffic Operational Analysis

The peak hour turning movement counts were used to establish existing operational levels of service (LOS) at the intersection of Garrisonville Road and Shelton Shop Road using Synchro 6 traffic capacity analysis software. Traffic signal timings during the AM and PM peak periods at the intersection were obtained from VDOT's Fredericksburg District Traffic Engineering Department.

Table 1 below presents the results of the intersection capacity analysis for the existing AM and PM peak hours of operation. As shown in the table, the intersection is currently operating at an overall LOS C in the AM and LOS D in the PM.

Table 1
Existing Conditions
Peak Period Intersection Level of Service and Delay (AM / PM Peak)

Intersection	AM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	C	22.9

Intersection	PM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	D	37.0

Notes:
(1) Total delay is being expressed as seconds per vehicle.

As shown in the table, the intersection is operating at an overall LOS C during the AM peak traffic hour and a LOS D during the weekday PM peak hour traffic. It should be noted that the westbound left-turn movement on Garrisonville Road is calculated to operate at LOS F with 95.6 seconds of average delay per vehicle during the PM peak hour. This is verified through observations at this intersection that revealed queues of over 20 vehicles in the left-turn bay, occasionally extending beyond the storage area and blocking traffic in the through lane. This is due to a very high volume of left-turning traffic (647 veh/hr) in a single left-turn lane, most likely commuter traffic returning from the I-95 corridor during the PM peak hour. Typically, a single left-turn lane can accommodate up to 300-400 vehicles per hour before experiencing queuing concerns

Projected Traffic

A trip generation analysis was performed to determine the number of new vehicle trips that the site is projected to generate during the weekday AM and PM peak hours. Trip generation rates for the proposed site were based on data published in the *ITE Trip Generation Manual, 7th Edition*. **Table 2** summarizes the results of the trip generation analysis.

Table 2
Trip Generation

Description	ITE Land Use Code	Units/sf	AM Peak Enter	AM Peak Exit	AM Peak Total	PM Peak Enter	PM Peak Exit	PM Peak Total	Daily
Conveniece w/Gas pumps	853	16 pumps	137	137	275	154	154	308	3,080
Fast Food Rest. w/ Drive-Thru	934	2,818 sf	76	73	149	51	47	98	1,398
Pharmacy w/ Drive-Thru	881	13,013 sf	20	15	35	55	57	112	1,147
Office	710	60,000 sf	82	11	93	15	74	89	661
		Total:	**315**	**236**	**552**	**275**	**332**	**607**	**6,286**

It should be noted that all estimates shown in **Table 2** are based on ITE's trip rates, with the exception of the daily traffic volume for the convenience with gas pumps land use. Because ITE's survey sample for daily traffic consists of uses with only 4 pumps (no samples were found to have more or less than 4 pumps), the ITE rates are not accurate to project for a 16 pump use for daily traffic. Therefore, the daily traffic estimated for the convenience use was conservatively calculated by multiplying the highest peak hour by 10, for a total of 3,080 trips per day.

The distribution of site-generated trips onto the roadway network was assigned based on an average of existing AM and PM traffic patterns. The average of the two time periods was used in order to conservatively estimate the amount of traffic that would come from and go to the east of the site, and because the difference in the AM and PM peak hour distributions is not significant enough to result in different recommendations for roadway and access improvements.

In general, 45% of the trips are projected to come from the east of the site on Garrisonville Road, 20% will come from the south on Shelton Shop Road, and 35% will come from the west on Garrisonville Road. Since the trip distribution considers an average of the AM and PM peak hour conditions, it was assumed that the outbound trip distribution would mirror the inbound distribution. This helps the capacity analysis of the traffic signal to be conservative, as it adds 45% of the outbound site trips to the southbound left-turn movement at the traffic signal, which would be one of the critical movements at this intersection. The ITE Trip Generation Manual was also used to determine the inbound and outbound splits for the proposed development, which is 57% entering and 43% exiting in the AM and 45.3% entering and 54.7% exiting in the PM. **Figure 3** illustrates the estimated overall arrival trip distribution pattern for the development. It is assumed for the development that a major access driveway would be aligned with Shelton Shop Road, and that potential additional right-in / right-out driveways may be needed along Garrisonville Road to accommodate the traffic for the separate parcels on site. The peak hour site trip assignments used in the analysis are illustrated in **Figure 4**.

Figure 3
Trip Distribution Pattern

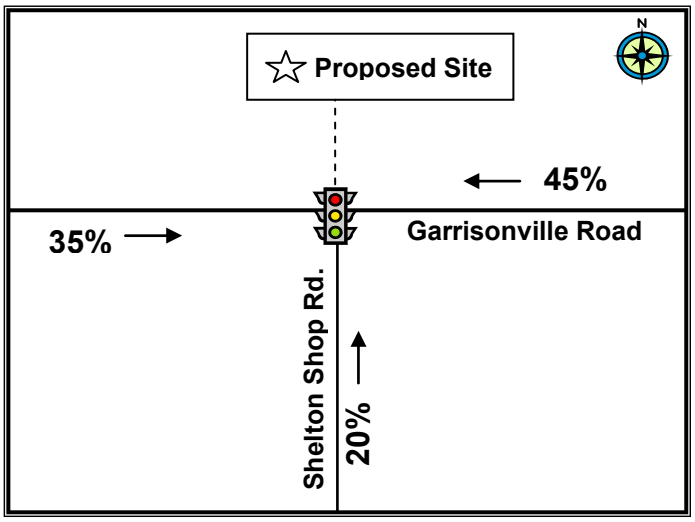
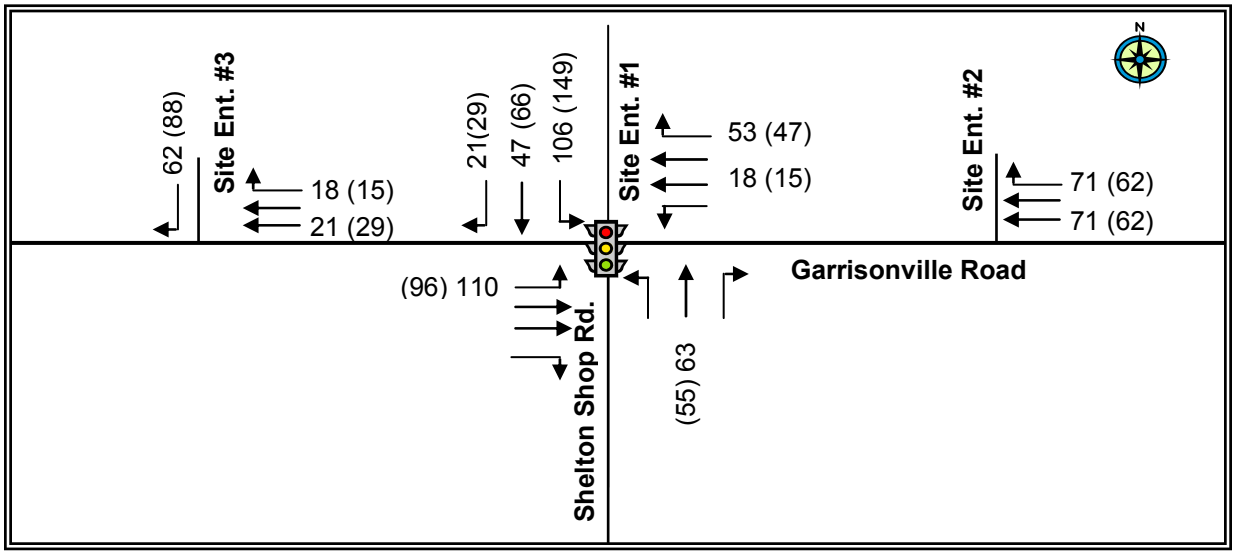


Figure 4
AM (PM) Peak Hour Site Trip Assignment



Future Build Traffic Operational Analysis

The future build traffic operational analysis for the site assesses traffic conditions in the future year of 2007 with the proposed development. To estimate regional growth in traffic volumes, the existing traffic volumes at the intersection of Garrisonville Road and Shelton Shop Road were grown 2% per year for 2 years. It should be noted that VDOT traffic count information shows that the ADT on Garrisonville Road at this location has been constant at 30,000 trips/day for the past 3 years, so this is a conservative estimate of regional growth in this area.

To determine the future traffic in the year 2007 with the proposed development, the trip generation rates shown in Table 2 were superimposed on the network traffic volumes (after regional growth) according to the trip distribution pattern described previously.

Site Access

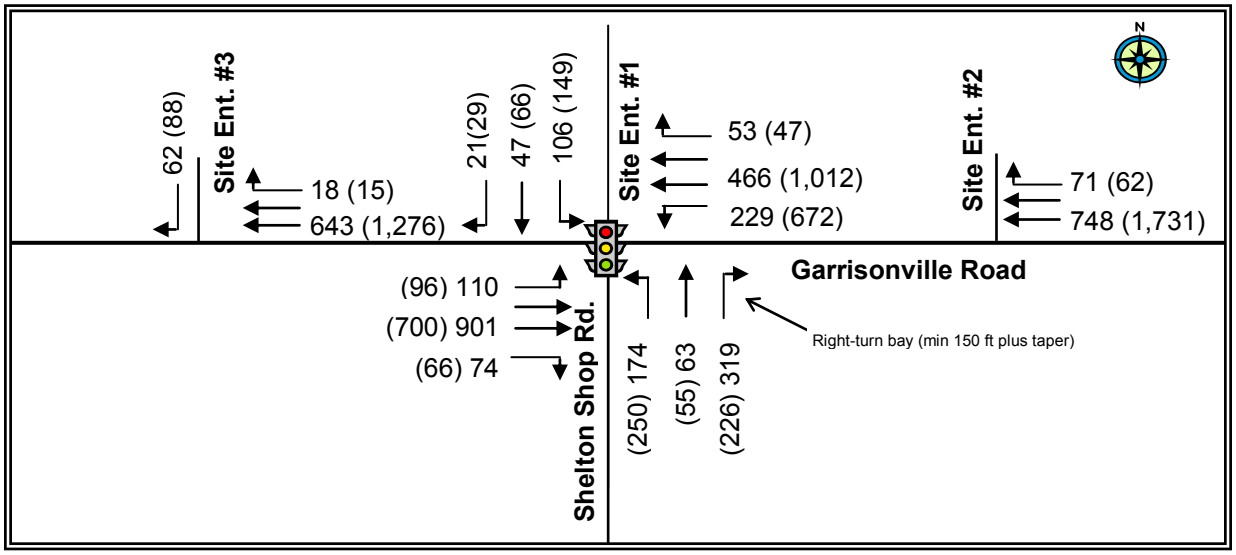
For purposes of analysis, the access for the proposed site was assumed to occur through a main site drive (referred to as Site Entrance 1) to be aligned with Shelton Shop Road, as well as two additional site entrances both to the east and the west of Shelton Shop Road. The two additional site entrances were assumed to be limited to right turns only. These entrances are shown schematically in Figure 4. In order to reduce traffic impacts due to merging and weaving traffic on westbound Garrisonville Road to the east of Shelton Shop Road, it is recommended that the easternmost site entrance (Site Entrance 2) be limited to a right-turn inbound movement only, and would not allow right-turning traffic out of the site. Instead, the merging and weaving concerns for right-turning traffic at this location can be eliminated by requiring the outbound movement to occur through the signalized intersection at Shelton Shop Road. The westernmost site entrance (Site Entrance 3) is recommended to include both right-turns in and out of the site. Both Site Entrances 2 and 3 should be located a minimum of 300 feet from the intersection of Shelton Shop Road in order to provide sufficient spacing for lane-changing and the deceleration and acceleration of vehicles. Due to the high volumes of westbound traffic on Garrisonville Road, all site entrances are recommended to include right-turn deceleration lanes into the site.

Future Build Traffic Volumes and Analysis

The Future Build traffic volumes during the weekday AM and PM peak hours after the development of the proposed site are illustrated in **Figure 5**. These traffic volumes were then analyzed using capacity analysis software to determine the recommended roadway improvements that would be necessary to accommodate the additional traffic generated by the proposed site.

The analysis of the future traffic volumes at the signalized intersection of Garrisonville Road and Shelton Shop Road reveal that the additional traffic generated by the proposed site would cause the intersection to drop from LOS D to LOS F during the PM peak traffic hour without any additional intersection improvements beyond the construction of a three-lane (one lane inbound and two lanes outbound) site access driveway and a westbound right-turn deceleration lane into the main site drive. The capacity analysis reveals that the northbound

Figure 5
Projected Future Build Traffic Volumes and Recommended Lane Usage- AM (PM) Peak Hours



movement into the site would operate at LOS F with the additional site traffic added to the northbound approach traffic. In addition, the westbound left-turn lane would continue to operate at LOS F as it does under existing conditions. Lastly, without changes in the traffic signal phasing, the southbound left-turn out of the site is also projected to operate at LOS F.

According the capacity analysis, the following two improvements are needed in order to reach acceptable LOS at the signalized intersection of Garrisonville Road and Shelton Shop Road. These improvements are illustrated in the general development plan attached at the end of this memorandum:

- The addition of a northbound through lane on the Shelton Shop Road approach to the intersection. This can be achieved by adding an exclusive northbound right-turn bay a minimum 150 feet in length (plus taper) in order to accommodate the projected vehicle queuing in the right-turn lane.

- The modification of the traffic signal to provide for the additional northbound through lane, and a change in signal phasing to provide for protected/permitted left-turn signal phasing for the northbound and southbound approaches.

With the addition of these two public roadway improvements, the following levels of service can be achieved at the signalized intersection, as shown in Table 3. The detailed capacity analysis worksheets for this intersection are provided at the end of this memorandum.

Table 3
Future Build Conditions With Improvements
Peak Period Intersection Level of Service and Delay (AM / PM Peak)

Intersection	AM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	C	26.9

Intersection	PM Peak LOS	Delay (1)
Garrisonville Road @ Shelton Shop Road	D	53.5

Notes:
(1) Total delay is being expressed as seconds per vehicle.

It should be noted that during the AM peak hour, the overall intersection is projected to continue to operate at LOS C and that all turning movements at the intersection are projected to operate at LOS D or better with the proposed improvements.

During the PM peak hour with the proposed improvements, the westbound left-turn lane on Garrisonville Road is projected to continue to operate at LOS F due the high turning volumes for this movement. It should be noted that this is an existing capacity problem at this intersection and that the proposed development will not add any traffic to this turning movement. It should also be noted that the eastbound left turn movement into the proposed site is projected to operate at LOS E during the PM peak hour. Although this movement is projected to operate at a lower LOS than existing conditions, it should be noted that the 95th percentile queue is projected to extend only 124 feet in a left-turn lane that is currently 150 feet plus taper, and that the volume-to-capacity ratio for this movement is projected to be only 0.78. The low LOS for this movement is therefore a result of the longer cycle length (approx. 135 seconds) used by VDOT at this intersection, and does not indicate a lack of capacity for this movement. All other movements at this intersection are projected to operate at LOS D or better during the PM peak hour with the proposed improvements.

Site Access Recommendations

As a result of the analysis performed for this study, the following access locations and road improvements are recommended as a part of the proposed development. These access locations and recommended road improvements are illustrated in the general development plan attached at the end of this memorandum:

- Construct a right-in only access driveway located approximately 300 feet east of the signalized intersection of Garrisonville Road and Shelton Shop Road.

- Construct a full-access driveway at the signalized intersection of Garrisonville Road and Shelton Shop Road. The new southbound approach should include an exclusive left-turn lane, right-turn lane and through lane. The northbound Shelton Shop Road approach to the intersection should be modified to include a new northbound through lane into the proposed site by constructing a new exclusive right-turn bay for a length of a minimum of 150 feet. These roadway improvements may also require modification of the traffic signal equipment.

- A right-in/out driveway on Garrisonville Road to be located approximately 300 feet west of the Shelton Shop Road intersection.

With the access locations and roadway improvements associated with the site as described above, the intersection of Garrisonville Road and Shelton Shop Road is projected to continue to operate at an overall LOS C and D during the weekday AM and PM Peak hours, respectively.

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Parking Summary Chart

Description	Required	Provided
PHARMACY STORE	52	67
FAST FOOD RESTAURANT	43	45
FUEL CENTER / RETAIL	19	52
OFFICE	179	180
TOTAL SPACES	293	344

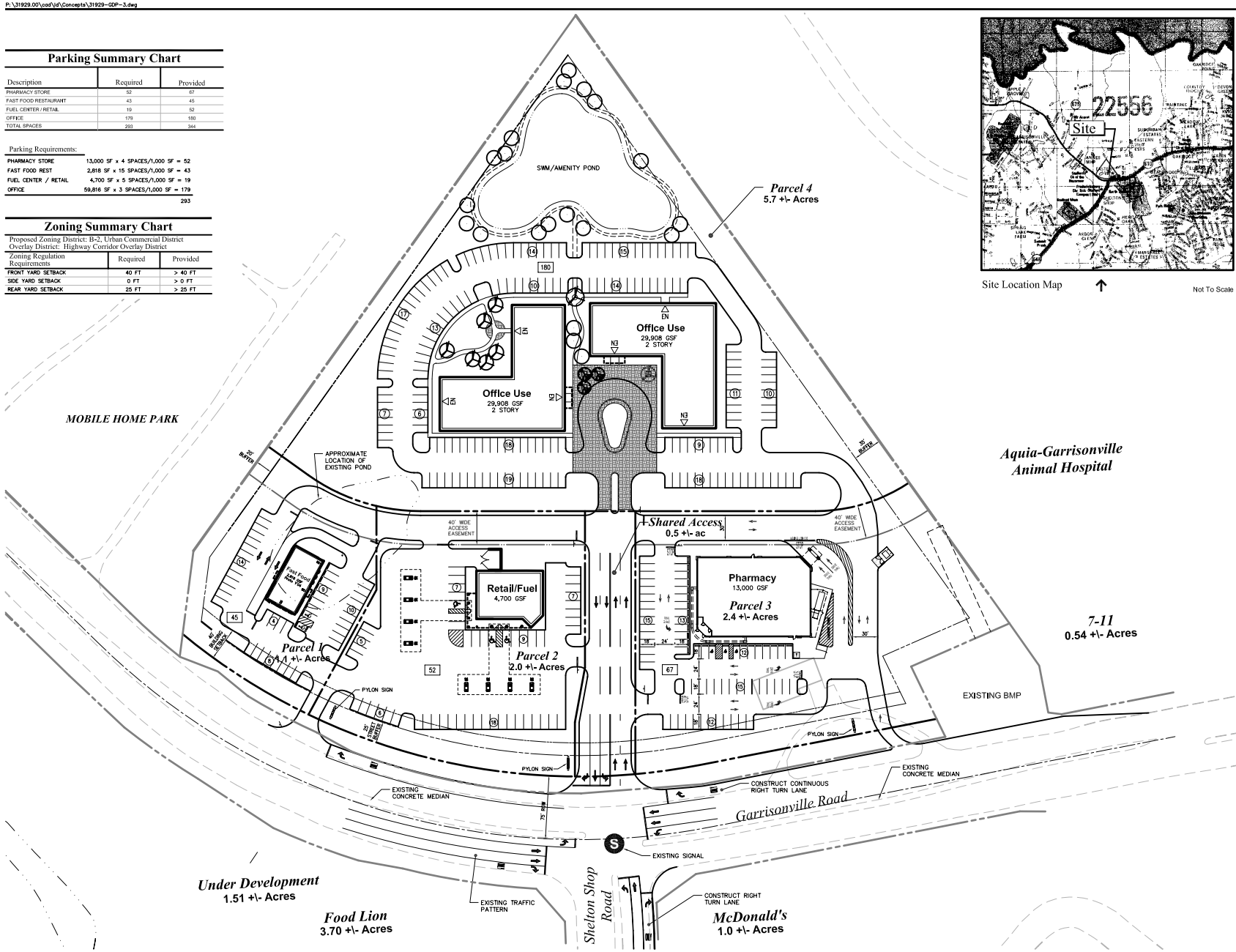
Parking Requirements:

PHARMACY STORE	13,000 SF x 4 SPACES/1,000 SF = 52
FAST FOOD REST	2,818 SF x 15 SPACES/1,000 SF = 43
FUEL CENTER / RETAIL	4,700 SF x 5 SPACES/1,000 SF = 19
OFFICE	59,816 SF x 3 SPACES/1,000 SF = 179
	293

Zoning Summary Chart

Proposed Zoning District: B-2, Urban Commercial District
Overlay District: Highway Corridor Overlay District

Zoning Regulation Requirements	Required	Provided
FRONT YARD SETBACK	40 FT	> 40 FT
SIDE YARD SETBACK	0 FT	> 0 FT
REAR YARD SETBACK	25 FT	> 25 FT



Site Location Map

Not To Scale

VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
115 South 15th Street, Suite 200
Richmond, Virginia 23219
804-343-7100 • FAX 804-343-1713

MID-ATLANTIC
commercial properties
401 East Las Olas Boulevard • Suite 1000, Fort Lauderdale, FL 33301
954.522.6010 • Fax 954.522.6056

N

50 0 50 100
SCALE IN FEET

No.	Revision	Date	Apprvd.

Designed by DZ | Drawn by DZ | Checked by RSC
CAD checked by | Approved by
Scale 1"=50' | Date February 17, 2006

Project Title
Mixed Use Development
Garrisonville Rd and Shelton Shop Rd
Rock Hill Magisterial District
Stafford County, Virginia

Issued for
Rezoning and CUP
of Tax Map 19-71

Not Approved for Construction

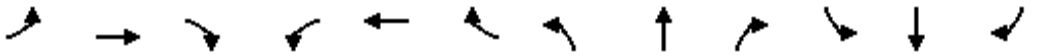
Drawing Title
General
Development
Plan

Drawing Number
GDP

Sheet 1 of 1

Project Number
31929

31929-GDP-3.DWG

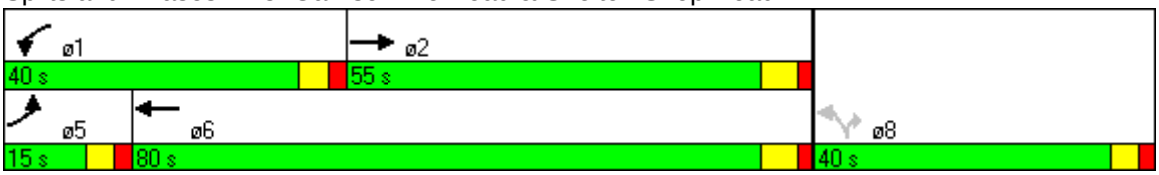


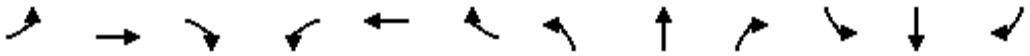
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50		50			
Trailing Detector (ft)	0	0	0	0	0		0		0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected				0.950			0.950					
Satd. Flow (prot)	1863	3223	1205	1719	2959	0	1517	0	1583	0	0	0
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	1863	3223	1205	1719	2959	0	1517	0	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			88						327			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		2765			2765			2449			2244	
Travel Time (s)		41.9			41.9			47.7			51.0	
Volume (vph)	0	867	71	221	431	0	167	0	307	0	0	0
Peak Hour Factor	0.92	0.91	0.81	0.92	0.88	0.92	0.77	0.92	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	2%	12%	34%	5%	22%	2%	19%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	953	88	240	490	0	217	0	327	0	0	0
Lane Group Flow (vph)	0	953	88	240	490	0	217	0	327	0	0	0
Turn Type	Prot		Free	Prot			custom		custom			
Protected Phases	5	2		1	6							
Permitted Phases			Free				8		8			
Detector Phases	5	2		1	6		8		8			
Minimum Initial (s)	5.0	12.0		5.0	12.0		6.0		6.0			
Minimum Split (s)	10.5	18.5		10.5	18.5		11.5		11.5			
Total Split (s)	15.0	55.0	0.0	40.0	80.0	0.0	40.0	0.0	40.0	0.0	0.0	0.0
Total Split (%)	11.1%	40.7%	0.0%	29.6%	59.3%	0.0%	29.6%	0.0%	29.6%	0.0%	0.0%	0.0%
Maximum Green (s)	9.5	48.5		34.5	73.5		34.5		34.5			
Yellow Time (s)	3.5	4.5		3.5	4.5		3.5		3.5			
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0		2.0			
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0		4.0			
Recall Mode	None	None		None	None		None		None			
Act Effct Green (s)		35.6	89.4	19.2	59.4		21.0		21.0			
Actuated g/C Ratio		0.40	1.00	0.21	0.66		0.23		0.23			
v/c Ratio		0.74	0.07	0.65	0.25		0.61		0.53			
Control Delay		28.9	0.1	44.6	6.8		42.1		7.3			
Queue Delay		0.0	0.0	0.0	0.0		0.0		0.0			
Total Delay		28.9	0.1	44.6	6.8		42.1		7.3			
LOS		C	A	D	A		D		A			
Approach Delay		26.5			19.3							
Approach LOS		C			B							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		226	0	122	49		107		0			
Queue Length 95th (ft)		454	0	270	104		200		74			
Internal Link Dist (ft)		2685			2685			2369			2164	
Turn Bay Length (ft)			500	300								
Base Capacity (vph)		1617	1205	612	2163		548		781			
Starvation Cap Reductn		0	0	0	0		0		0			
Spillback Cap Reductn		0	0	0	0		0		0			
Storage Cap Reductn		0	0	0	0		0		0			
Reduced v/c Ratio		0.59	0.07	0.39	0.23		0.40		0.42			

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 89.4	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 22.9	Intersection LOS: C
Intersection Capacity Utilization 55.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Garrisonville Road & Shelton Shop Road





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50		50			
Trailing Detector (ft)	0	0	0	0	0		0		0			
Turning Speed (mph)	15		9	25		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850			
Flt Protected	0.950			*0.950			0.950					
Satd. Flow (prot)	1805	3574	1615	1805	3574	0	1736	0	1615	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1805	3574	1615	1805	3574	0	1736	0	1615	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			117						252			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		2765			2765			2449			2244	
Travel Time (s)		41.9			41.9			47.7			51.0	
Volume (vph)	2	674	63	647	959	0	240	0	217	0	0	0
Peak Hour Factor	0.50	0.94	0.54	0.90	0.96	0.92	0.91	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	2%	0%	2%	2%	2%
Adj. Flow (vph)	4	717	117	719	999	0	264	0	252	0	0	0
Lane Group Flow (vph)	4	717	117	719	999	0	264	0	252	0	0	0
Turn Type	Prot		Free	Prot			custom		custom			
Protected Phases	1	6		5	2							
Permitted Phases			Free				4		4			
Detector Phases	1	6		5	2		4		4			
Minimum Initial (s)	5.0	12.0		5.0	12.0		6.0		6.0			
Minimum Split (s)	10.5	18.5		10.5	18.5		11.5		11.5			
Total Split (s)	10.5	64.0	0.0	40.0	93.5	0.0	31.0	0.0	31.0	0.0	0.0	0.0
Total Split (%)	7.8%	47.4%	0.0%	29.6%	69.3%	0.0%	23.0%	0.0%	23.0%	0.0%	0.0%	0.0%
Maximum Green (s)	5.0	57.5		34.5	87.0		25.5		25.5			
Yellow Time (s)	3.5	4.5		3.5	4.5		3.5		3.5			
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0		2.0			
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0		4.0			
Recall Mode	None	None		None	None		None		None			
Act Effct Green (s)	6.6	29.3	100.1	36.5	68.1		22.1		22.1			
Actuated g/C Ratio	0.06	0.29	1.00	0.36	0.68		0.22		0.22			
v/c Ratio	0.04	0.68	0.07	1.09	0.41		0.69		0.46			
Control Delay	52.5	32.3	0.1	95.6	8.6		42.7		6.7			
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0			
Total Delay	52.5	32.3	0.1	95.6	8.6		42.7		6.7			
LOS	D	C	A	F	A		D		A			
Approach Delay		27.9			45.0							
Approach LOS		C			D							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	3	217	0	~553	133		156		0			
Queue Length 95th (ft)	8	288	0	#898	248		268		54			
Internal Link Dist (ft)		2685			2685			2369			2164	
Turn Bay Length (ft)	150		500	300								
Base Capacity (vph)	109	1648	1615	659	2634		449		605			
Starvation Cap Reductn	0	0	0	0	0		0		0			
Spillback Cap Reductn	0	0	0	0	0		0		0			
Storage Cap Reductn	0	0	0	0	0		0		0			
Reduced v/c Ratio	0.04	0.44	0.07	1.09	0.38		0.59		0.42			

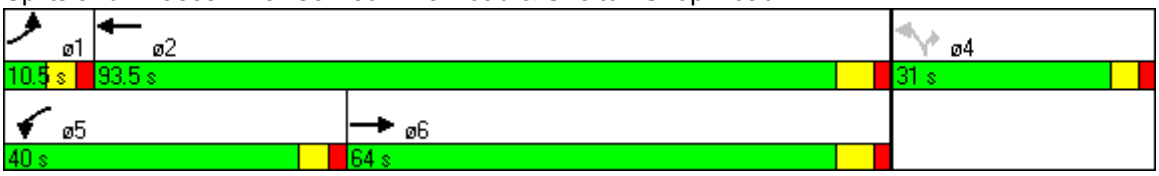
Intersection Summary			
Area Type:	Other		
Cycle Length: 135			
Actuated Cycle Length: 100.1			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 37.0		Intersection LOS: D	
Intersection Capacity Utilization 77.8%		ICU Level of Service D	
Analysis Period (min) 15			

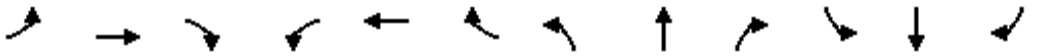
* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Garrisonville Road & Shelton Shop Road





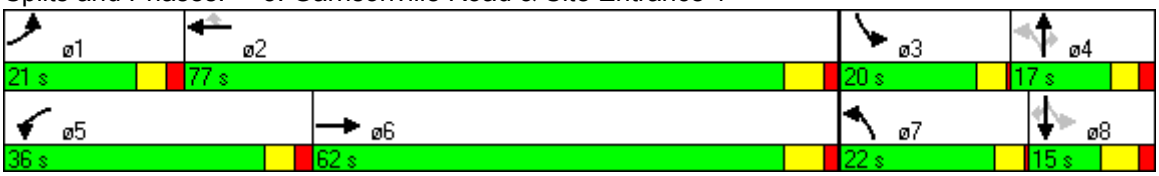
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		1	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	25		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			*0.950			0.950			0.950		
Satd. Flow (prot)	1805	3574	1615	1805	3574	1615	1736	1863	1615	1770	1863	1583
Flt Permitted	0.950			0.950			0.612			0.713		
Satd. Flow (perm)	1805	3574	1615	1805	3574	1615	1118	1863	1615	1328	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			58			371			23
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		1270			1610			2444			1996	
Travel Time (s)		19.2			24.4			47.6			45.4	
Volume (vph)	110	901	74	229	466	53	174	63	319	106	47	21
Peak Hour Factor	0.50	0.94	0.54	0.90	0.96	0.92	0.91	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	2%	0%	2%	2%	2%
Adj. Flow (vph)	220	959	137	254	485	58	191	68	371	115	51	23
Lane Group Flow (vph)	220	959	137	254	485	58	191	68	371	115	51	23
Turn Type	Prot		Free	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			Free			2	4		4	8		8
Detector Phases	1	6		5	2	2	7	4	4	3	8	8
Minimum Initial (s)	5.0	12.0		5.0	12.0	12.0	4.0	4.5	4.5	4.0	3.5	3.5
Minimum Split (s)	10.5	18.5		10.5	18.5	18.5	8.0	10.0	10.0	8.0	10.0	10.0
Total Split (s)	21.0	62.0	0.0	36.0	77.0	77.0	22.0	17.0	17.0	20.0	15.0	15.0
Total Split (%)	15.6%	45.9%	0.0%	26.7%	57.0%	57.0%	16.3%	12.6%	12.6%	14.8%	11.1%	11.1%
Maximum Green (s)	15.5	55.5		30.5	70.5	70.5	18.0	11.5	11.5	16.0	8.5	8.5
Yellow Time (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5	3.5	3.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	17.9	36.5	94.5	20.0	38.6	38.6	24.1	13.2	13.2	17.1	11.3	11.3
Actuated g/C Ratio	0.19	0.39	1.00	0.21	0.41	0.41	0.25	0.14	0.14	0.18	0.12	0.12
v/c Ratio	0.65	0.69	0.08	0.66	0.33	0.08	0.50	0.26	0.68	0.41	0.24	0.11
Control Delay	51.6	27.2	0.1	40.6	18.6	4.2	36.6	47.7	11.5	36.2	51.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.6	27.2	0.1	40.6	18.6	4.2	36.6	47.7	11.5	36.2	51.6	21.1
LOS	D	C	A	D	B	A	D	D	B	D	D	C
Approach Delay		28.4			24.6			23.0			38.5	
Approach LOS		C			C			C			D	

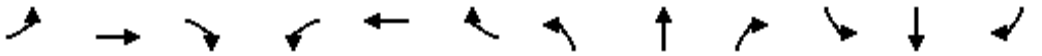
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	132	268	0	148	107	0	94	38	0	54	30	0
Queue Length 95th (ft)	144	414	0	283	150	22	212	104	77	133	85	28
Internal Link Dist (ft)		1190			1530			2364			1916	
Turn Bay Length (ft)	150		500	300								
Base Capacity (vph)	357	1832	1615	570	2076	963	423	297	570	368	232	218
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.52	0.08	0.45	0.23	0.06	0.45	0.23	0.65	0.31	0.22	0.11

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 94.5	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 63.9%	ICU Level of Service B
Analysis Period (min) 15	

* User Entered Value

Splits and Phases: 3: Garrisonville Road & Site Entrance 1





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		500	300		0	0		0	0		0
Storage Lanes	1		1	1		1	1		1	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	25		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			*0.950			0.950			0.950		
Satd. Flow (prot)	1805	3574	1615	1805	3574	1615	1736	1863	1615	1770	1863	1583
Flt Permitted	0.950			0.950			0.708			0.656		
Satd. Flow (perm)	1805	3574	1615	1805	3574	1615	1293	1863	1615	1222	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			122			51			263			32
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		1270			1610			2444			1996	
Travel Time (s)		19.2			24.4			47.6			45.4	
Volume (vph)	96	700	66	672	1012	47	250	55	226	149	66	29
Peak Hour Factor	0.50	0.94	0.54	0.90	0.96	0.92	0.91	0.92	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	4%	2%	0%	2%	2%	2%
Adj. Flow (vph)	192	745	122	747	1054	51	275	60	263	162	72	32
Lane Group Flow (vph)	192	745	122	747	1054	51	275	60	263	162	72	32
Turn Type	Prot		Free	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			Free			2	4		4	8		8
Detector Phases	1	6		5	2	2	7	4	4	3	8	8
Minimum Initial (s)	5.0	12.0		5.0	12.0	12.0	4.0	6.0	6.0	4.0	12.0	12.0
Minimum Split (s)	10.5	18.5		10.5	18.5	18.5	8.0	11.5	11.5	8.0	18.5	18.5
Total Split (s)	20.0	56.0	0.0	43.0	79.0	79.0	18.0	17.0	17.0	19.0	18.0	18.0
Total Split (%)	14.8%	41.5%	0.0%	31.9%	58.5%	58.5%	13.3%	12.6%	12.6%	14.1%	13.3%	13.3%
Maximum Green (s)	14.5	49.5		37.5	72.5	72.5	14.0	11.5	11.5	15.0	11.5	11.5
Yellow Time (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5	3.5	3.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	0.5	2.0	2.0	0.5	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	4.0		3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	15.6	33.2	114.3	39.4	57.0	57.0	26.6	12.8	12.8	23.5	14.0	14.0
Actuated g/C Ratio	0.14	0.29	1.00	0.34	0.50	0.50	0.23	0.11	0.11	0.21	0.12	0.12
v/c Ratio	0.78	0.72	0.08	1.20	0.59	0.06	0.76	0.29	0.64	0.52	0.32	0.15
Control Delay	68.9	37.8	0.1	140.3	21.8	4.2	54.0	52.7	13.0	41.5	53.5	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.9	37.8	0.1	140.3	21.8	4.2	54.0	52.7	13.0	41.5	53.5	18.0
LOS	E	D	A	F	C	A	D	D	B	D	D	B
Approach Delay		39.1			69.1			35.9			41.9	
Approach LOS		D			E			D			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	142	264	0	~702	294	0	180	42	0	98	51	0
Queue Length 95th (ft)	124	331	0	#1032	358	20	#352	91	68	176	105	32
Internal Link Dist (ft)		1190			1530			2364			1916	
Turn Bay Length (ft)	150		500	300								
Base Capacity (vph)	254	1402	1615	622	2031	940	362	226	427	343	222	216
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.53	0.08	1.20	0.52	0.05	0.76	0.27	0.62	0.47	0.32	0.15

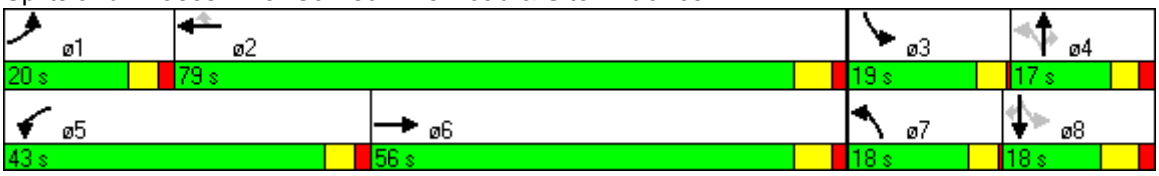
Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 114.3	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.20	
Intersection Signal Delay: 53.5	Intersection LOS: D
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

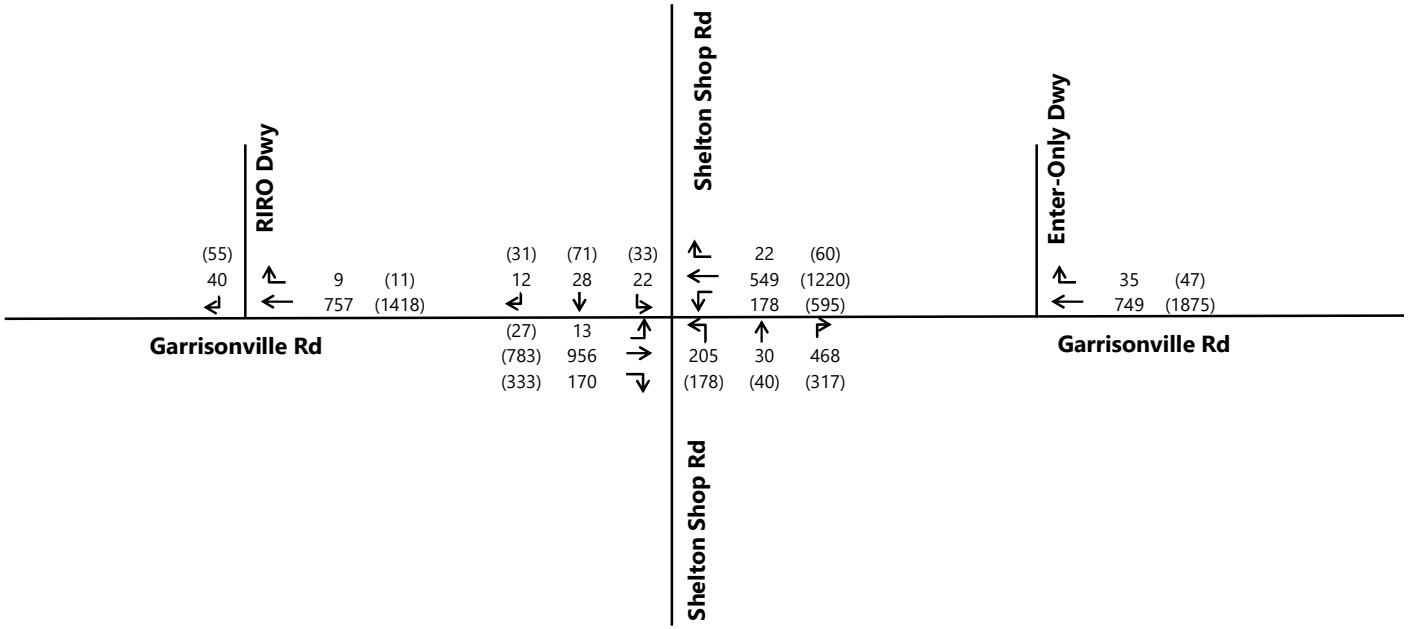
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Garrisonville Road & Site Entrance 1



Bowman

Appendix D
Traffic Volume and Traffic Distribution Exhibits



NOT TO SCALE

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

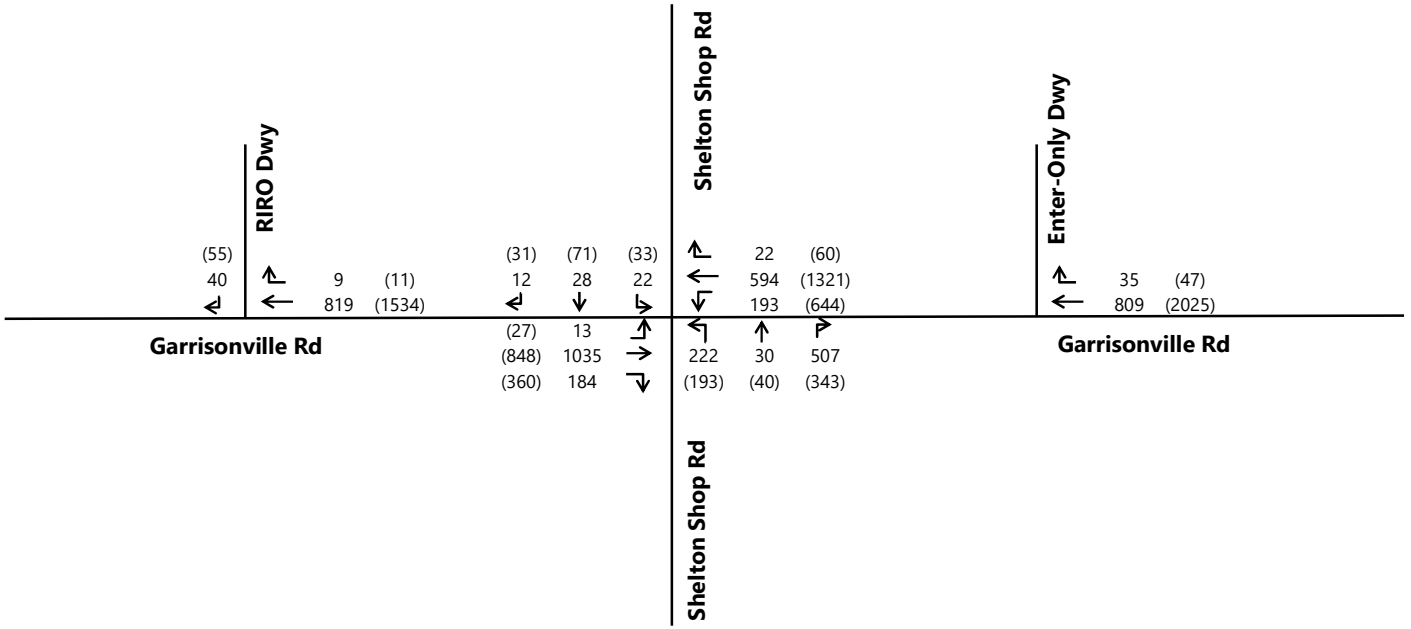
2018 Existing
Peak Hour Traffic Volumes

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

1

PROJECT NO.
100397-01-001



NOT TO SCALE

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

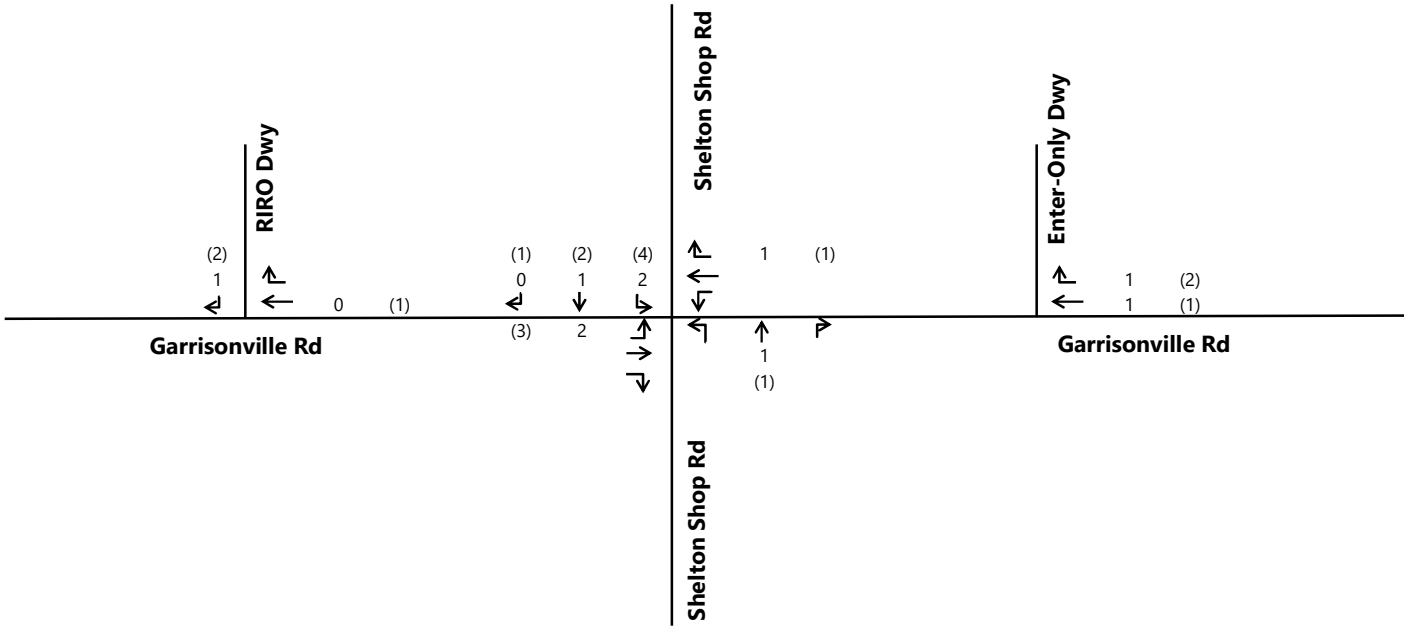
2022 Background
Peak Hour Traffic Volumes

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

2

PROJECT NO.
100397-01-001



NOT TO SCALE

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

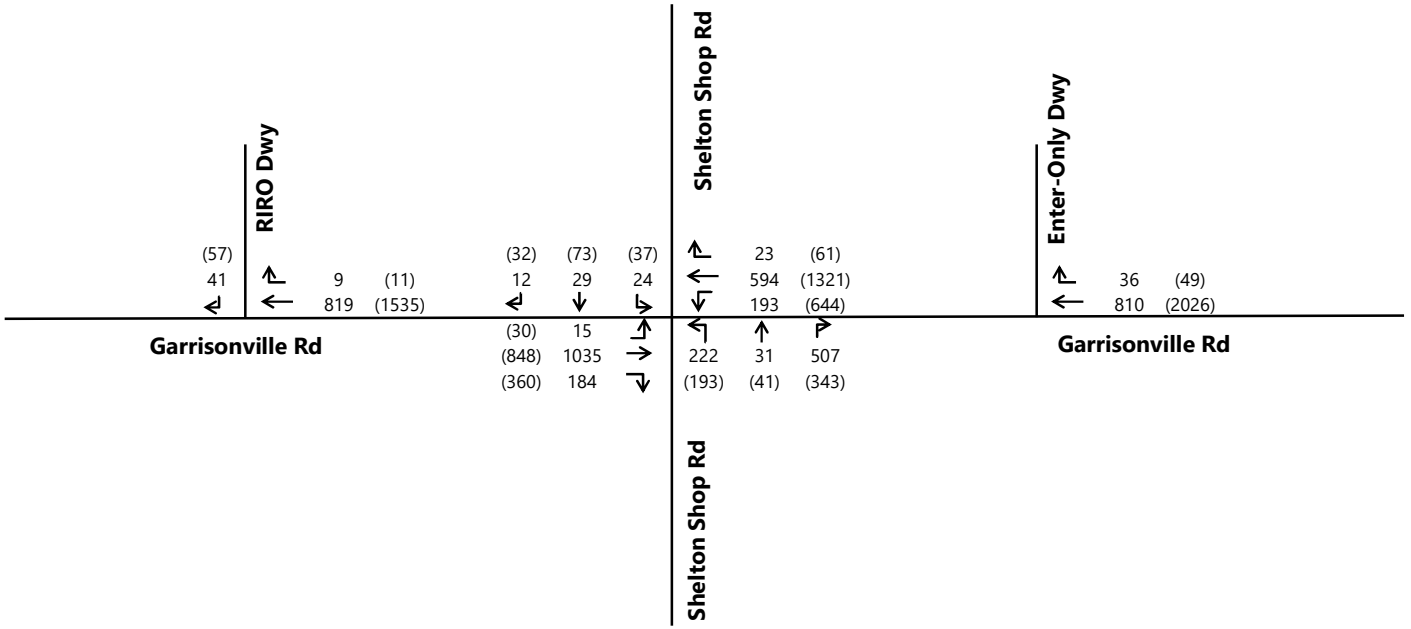
Stafford Storage Site Trips

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

3

PROJECT NO.
100397-01-001



NOT TO SCALE

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

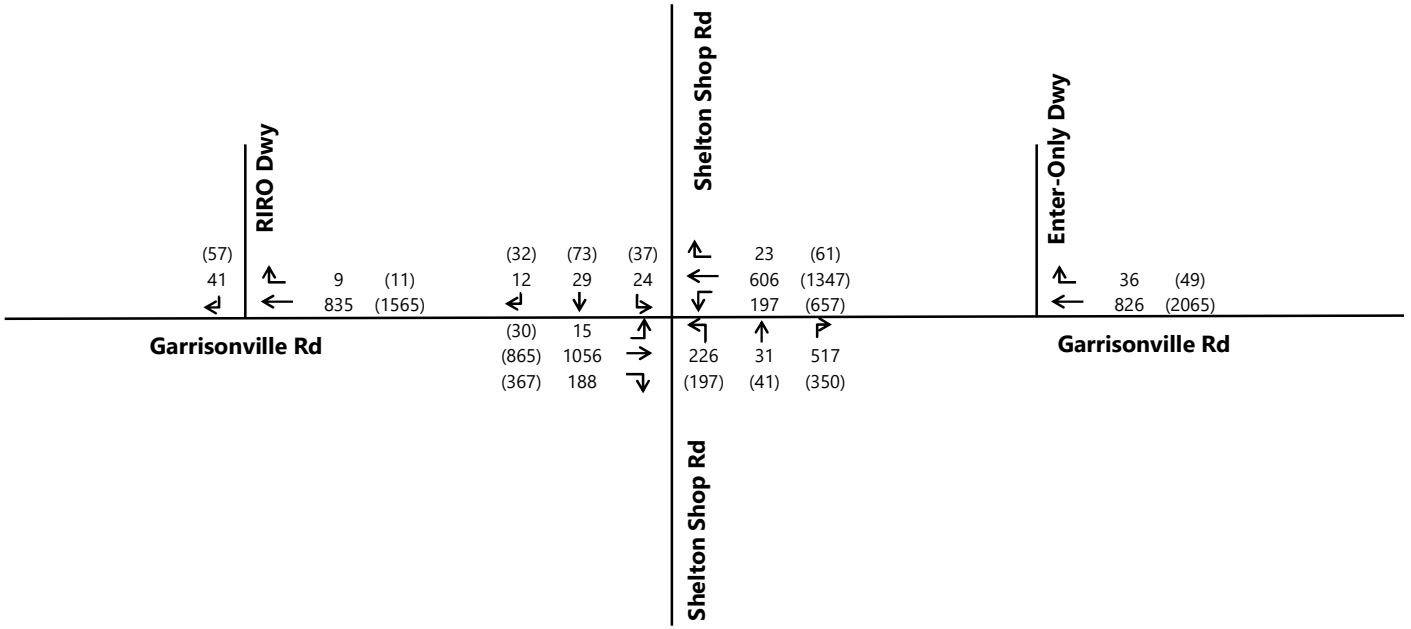
2022 Existing
Peak Hour Traffic Volumes

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

4

PROJECT NO.
100397-01-001



NOT TO SCALE

Legend

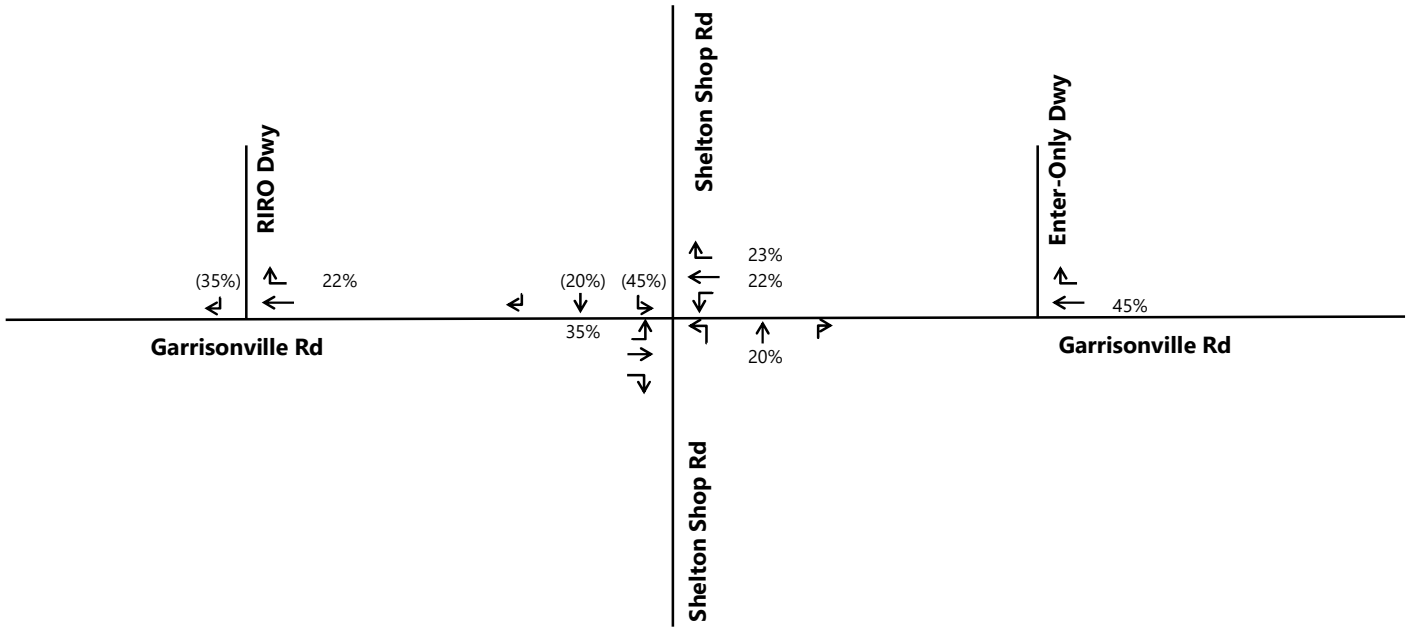
123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

2023 No Build
Peak Hour Traffic Volumes
Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT
5
PROJECT NO.
100397-01-001



NOT TO SCALE

N

Legend

12% - Entering Distribution

(12%) - Exiting Distribution

Bowman

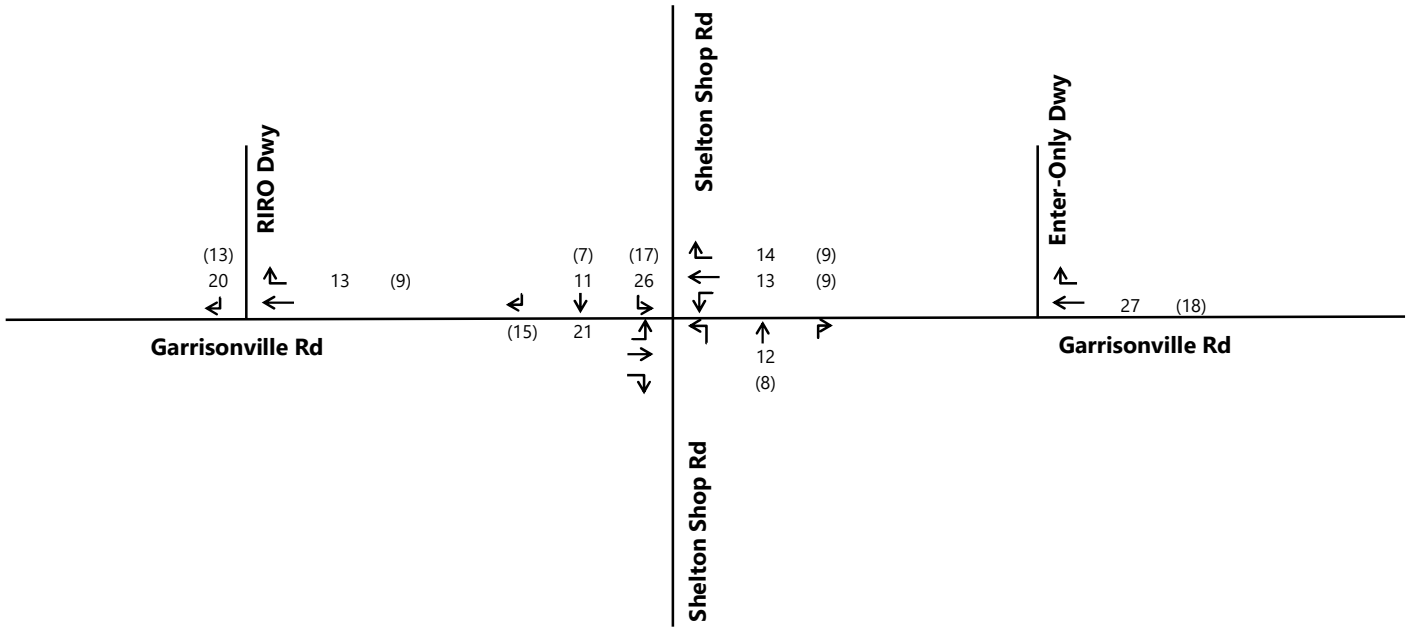
Primary Distribution

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

6

PROJECT NO.
100397-01-001



NOT TO SCALE

N

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

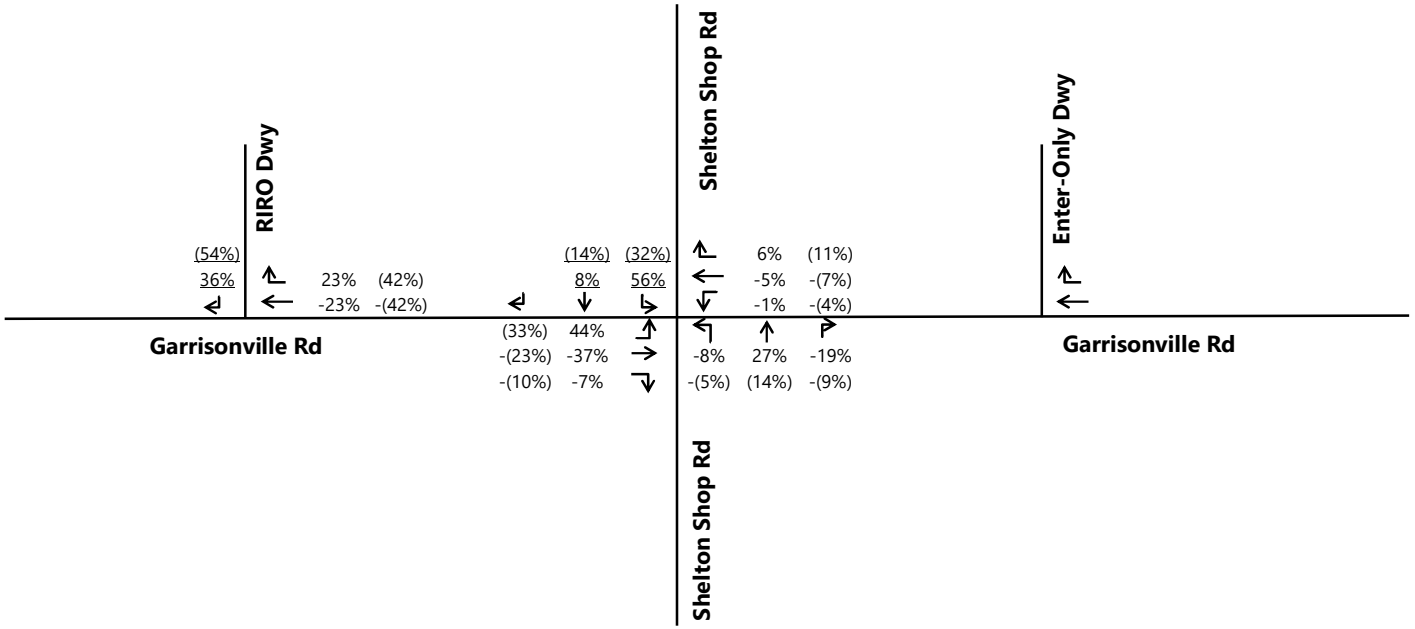
Primary Trips

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

7

PROJECT NO.
100397-01-001



Legend

12% - AM Entering Distribution

(12%) - PM Entering Distribution

12% - AM Exiting Distribution

(12%) - PM Exiting Distribution

NOT TO SCALE

N

Bowman

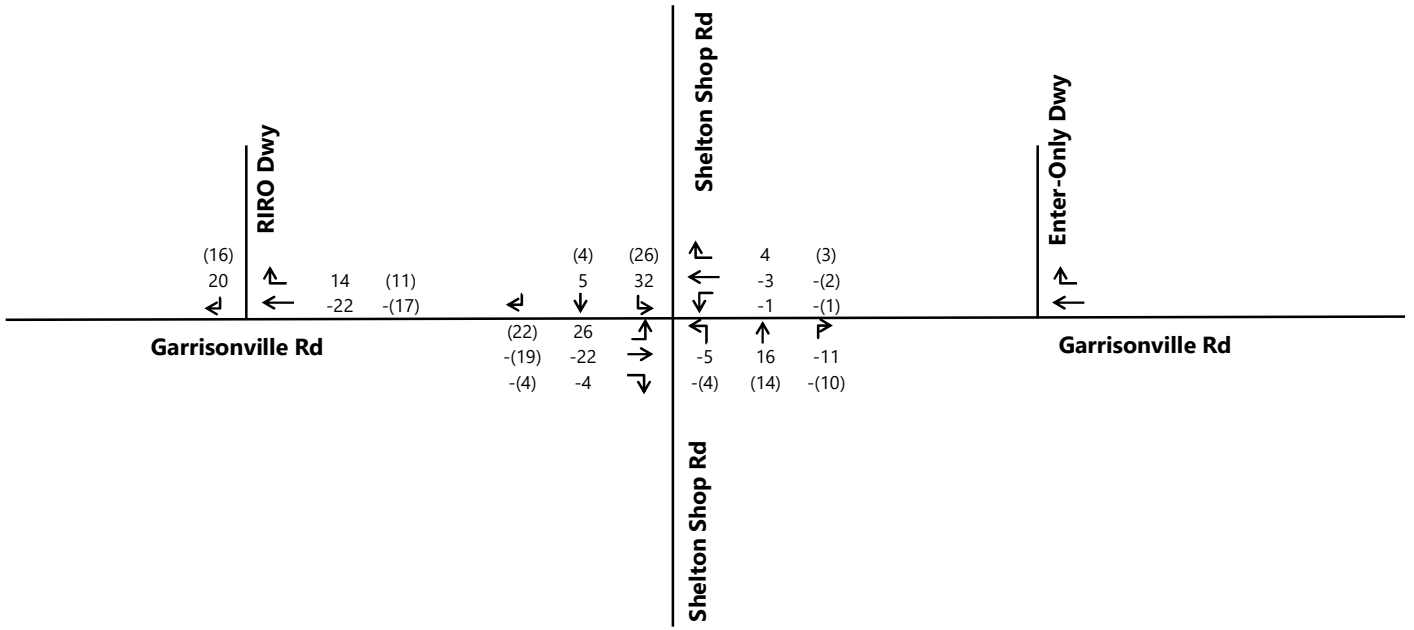
Pass-By Distribution

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

8

PROJECT NO.
100397-01-001



NOT TO SCALE

N

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

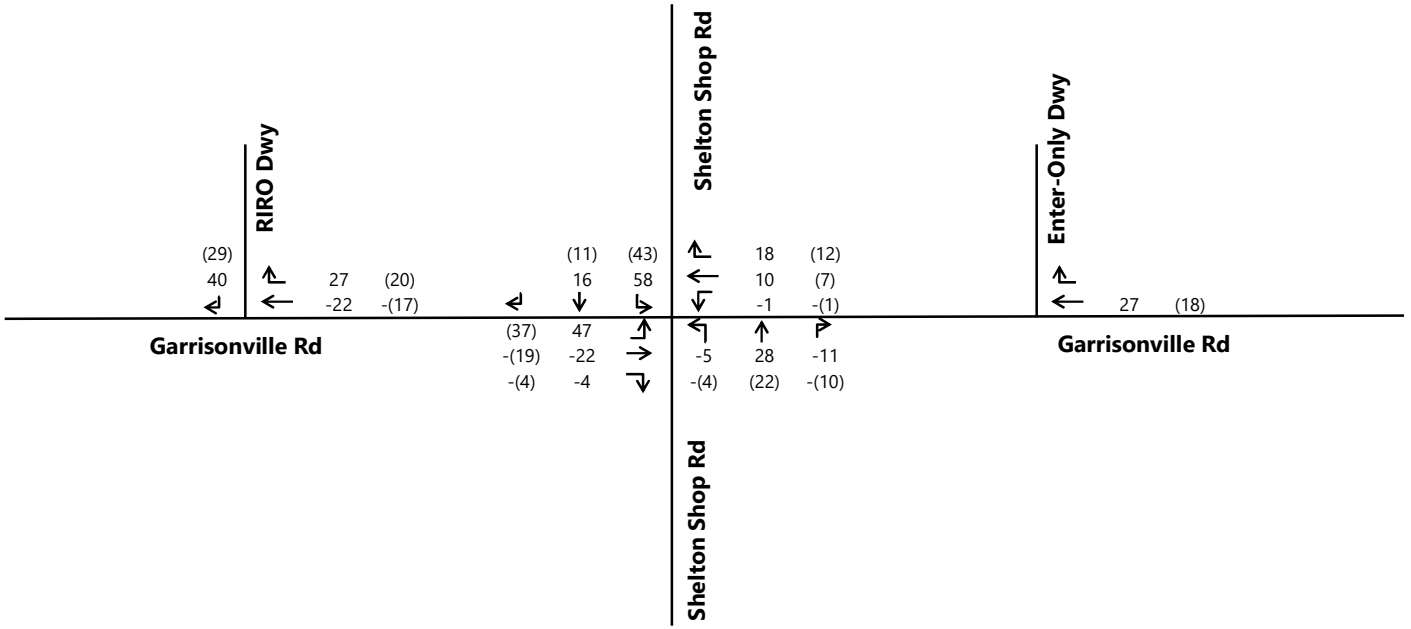
Pass-By Trips

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

9

PROJECT NO.
100397-01-001



NOT TO SCALE

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

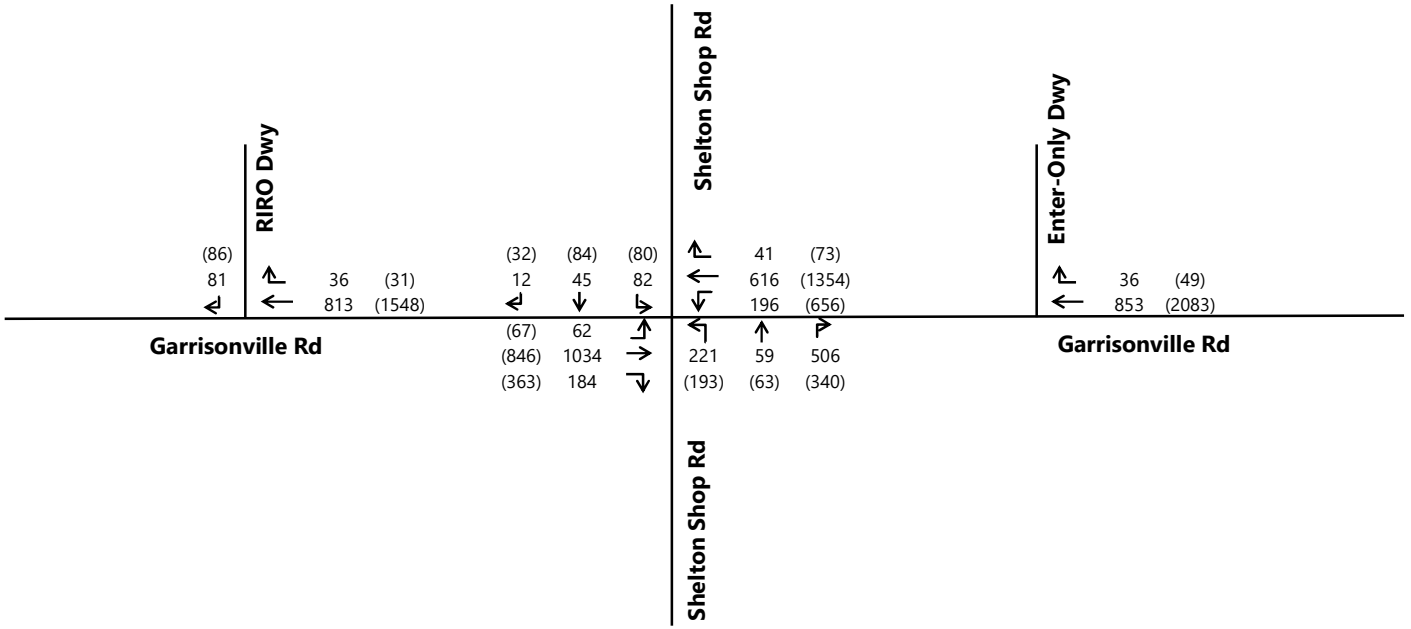
Total Site-Generated Trips

Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT

10

PROJECT NO.
100397-01-001



NOT TO SCALE

Legend

123 - AM Peak Hour Traffic Volumes

(123) - PM Peak Hour Traffic Volumes

Bowman

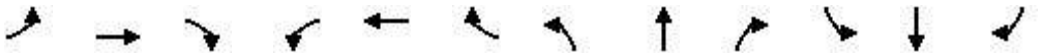
2023 Build
Peak Hour Traffic Volumes
Garrisonville Chick-fil-A TIA
Stafford County, VA

EXHIBIT
11

PROJECT NO.
100397-01-001

Bowman

Appendix E
Existing (2022) Capacity Analysis

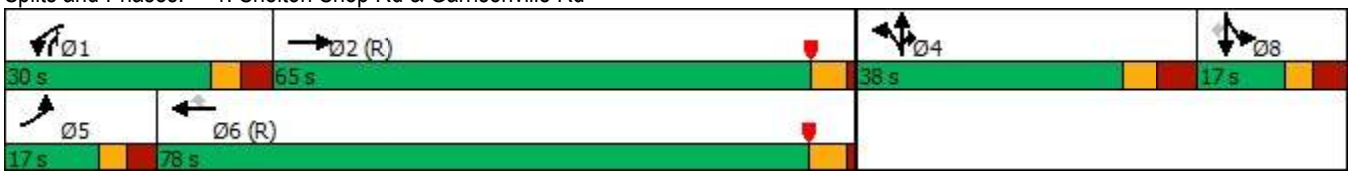


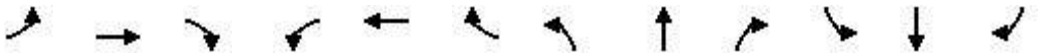
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1035	184	193	594	23	222	31	507	24	29	12
Future Volume (vph)	15	1035	184	193	594	23	222	31	507	24	29	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	11	12	11	11	11	11	11	12
Grade (%)		4%			0%			3%			4%	
Storage Length (ft)	230		310	345		280	0		90	0		90
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (ft)	0			0			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			35			30	
Link Distance (ft)		383			763			657			512	
Travel Time (s)		6.5			13.0			12.8			11.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	30%	2%	6%	2%	10%	17%	2%	9%	4%	2%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Free	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	5	2		1	6		4	4	4 1	8	8	
Permitted Phases			Free			6						8
Minimum Split (s)	13.0	36.0		14.0	36.0	36.0	16.0	16.0		15.0	15.0	15.0
Total Split (s)	17.0	65.0		30.0	78.0	78.0	38.0	38.0		17.0	17.0	17.0
Total Split (%)	11.3%	43.3%		20.0%	52.0%	52.0%	25.3%	25.3%		11.3%	11.3%	11.3%
Maximum Green (s)	10.5	60.0		23.0	72.8	72.8	29.8	29.8		9.9	9.9	9.9
Yellow Time (s)	3.2	4.0		3.4	4.2	4.2	3.7	3.7		3.0	3.0	3.0
All-Red Time (s)	3.3	1.0		3.6	1.0	1.0	4.5	4.5		4.1	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	5.0		7.0	5.2	5.2		8.2		7.1	7.1	7.1
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Minimum Gap (s)	3.0	4.5		3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
Time Before Reduce (s)	0.0	35.0		0.0	35.0	35.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	1.0		0.0	1.0	1.0	0.0	0.0		0.0	0.0	0.0
Walk Time (s)		7.0			7.0	7.0						
Flash Dont Walk (s)		22.0			22.0	22.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	10.5	60.0	150.0	23.0	72.8	72.8		29.8	51.6	9.9	9.9	9.9
Actuated g/C Ratio	0.07	0.40	1.00	0.15	0.49	0.49		0.20	0.34	0.07	0.07	0.07
v/c Ratio	0.14	0.85	0.16	0.80	0.40	0.03		0.89	0.53	0.25	0.28	0.05
Control Delay	68.4	48.2	0.3	83.7	25.7	0.1		87.4	16.9	73.0	73.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	68.4	48.2	0.3	83.7	25.7	0.1		87.4	16.9	73.0	73.4	0.3
LOS	E	D	A	F	C	A		F	B	E	E	A
Approach Delay		41.3			38.8			40.4			59.9	
Approach LOS		D			D			D			E	

Intersection Summary	
Area Type:	Other
Cycle Length: 150	
Actuated Cycle Length: 150	

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 40.8 Intersection LOS: D
Intersection Capacity Utilization 76.7% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Shelton Shop Rd & Garrisonville Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	1035	184	193	594	23	222	31	507	24	29	12
Future Volume (veh/h)	15	1035	184	193	594	23	222	31	507	24	29	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1776	1761	1361	1870	1811	1870	1699	1595	1817	1672	1746	1776
Adj Flow Rate, veh/h	16	1125	0	210	646	25	241	34	551	26	32	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	30	2	6	2	10	17	2	9	4	2
Cap, veh/h	118	1337		273	1672	770	266	37	953	105	115	99
Arrive On Green	0.07	0.40	0.00	0.15	0.49	0.49	0.20	0.20	0.20	0.07	0.07	0.07
Sat Flow, veh/h	1692	3346	1154	1781	3441	1585	1339	189	2711	1593	1746	1505
Grp Volume(v), veh/h	16	1125	0	210	646	25	275	0	551	26	32	13
Grp Sat Flow(s),veh/h/ln	1692	1673	1154	1781	1721	1585	1528	0	1355	1593	1746	1505
Q Serve(g_s), s	1.3	45.7	0.0	17.0	17.8	1.2	26.4	0.0	24.9	2.3	2.6	1.2
Cycle Q Clear(g_c), s	1.3	45.7	0.0	17.0	17.8	1.2	26.4	0.0	24.9	2.3	2.6	1.2
Prop In Lane	1.00		1.00	1.00		1.00	0.88		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	1337		273	1672	770	303	0	953	105	115	99
V/C Ratio(X)	0.14	0.84		0.77	0.39	0.03	0.91	0.00	0.58	0.25	0.28	0.13
Avail Cap(c_a), veh/h	118	1337		273	1672	770	303	0	953	105	115	99
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.6	40.8	0.0	61.1	24.4	20.2	58.8	0.0	39.6	66.6	66.7	66.1
Incr Delay (d2), s/veh	2.4	6.6	0.0	18.7	0.7	0.1	32.6	0.0	2.6	5.6	5.9	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	19.6	0.0	9.0	7.3	0.5	12.9	0.0	8.7	1.1	1.4	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.0	47.4	0.0	79.8	25.1	20.2	91.4	0.0	42.2	72.2	72.7	68.8
LnGrp LOS	E	D		E	C	C	F	A	D	E	E	E
Approach Vol, veh/h		1141	A		881			826			71	
Approach Delay, s/veh		47.6			38.0			58.6			71.8	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	30.0	65.2		38.0	17.0	78.2		17.0				
Change Period (Y+Rc), s	7.0	* 5.2		* 8.2	6.5	5.2		7.1				
Max Green Setting (Gmax), s	23.0	* 60		* 30	10.5	72.8		9.9				
Max Q Clear Time (g_c+I1), s	19.0	47.7		28.4	3.3	19.8		4.6				
Green Ext Time (p_c), s	0.2	8.1		0.8	0.0	8.6		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		48.4
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Volume (vph)	0	1234	819	9	0	41
Future Volume (vph)	0	1234	819	9	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	12	12
Grade (%)		4%	-4%		0%	
Link Speed (mph)		40	40		30	
Link Distance (ft)		595	383		437	
Travel Time (s)		10.1	6.5		9.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	7%	7%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.4%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1234	819	9	0	41
Future Vol, veh/h	0	1234	819	9	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-4	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	7	7	2	2	2
Mvmt Flow	0	1341	890	10	0	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	445
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	561
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	561
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	561
HCM Lane V/C Ratio	-	-	-	0.079
HCM Control Delay (s)	-	-	-	12
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3028	2910	2970	2836	2867	2895	2960
Vehs Exited	2992	2906	2975	2844	2858	2885	2954
Starting Vehs	47	48	53	44	56	43	56
Ending Vehs	83	52	48	36	65	53	62
Travel Distance (mi)	975	940	960	920	926	938	955
Travel Time (hr)	73.2	64.2	65.4	61.5	65.3	76.4	76.0
Total Delay (hr)	44.8	36.9	37.6	34.8	38.4	49.2	48.3
Total Stops	2205	2051	2041	1902	1985	1968	2074
Fuel Used (gal)	47.8	45.0	46.1	43.8	44.8	47.8	48.4

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	2883	2852	2923	2912
Vehs Exited	2889	2837	2900	2903
Starting Vehs	51	36	46	47
Ending Vehs	45	51	69	57
Travel Distance (mi)	935	922	940	941
Travel Time (hr)	66.9	57.9	68.7	67.5
Total Delay (hr)	39.7	31.4	41.4	40.2
Total Stops	2098	1796	2059	2018
Fuel Used (gal)	45.7	42.7	46.3	45.8

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	759	727	724	666	729	697	653
Vehs Exited	737	712	726	651	736	686	675
Starting Vehs	47	48	53	44	56	43	56
Ending Vehs	69	63	51	59	49	54	34
Travel Distance (mi)	241	233	234	213	237	224	216
Travel Time (hr)	16.4	15.3	14.7	13.3	17.6	14.6	14.6
Total Delay (hr)	9.4	8.6	7.9	7.2	10.8	8.1	8.4
Total Stops	547	492	476	456	513	470	462
Fuel Used (gal)	11.5	11.0	10.8	10.0	11.7	10.4	10.4

Interval #1 Information 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	679	696	680	700
Vehs Exited	678	685	678	696
Starting Vehs	51	36	46	47
Ending Vehs	52	47	48	52
Travel Distance (mi)	219	224	218	226
Travel Time (hr)	15.9	13.7	16.2	15.2
Total Delay (hr)	9.5	7.3	9.9	8.7
Total Stops	496	426	521	485
Fuel Used (gal)	10.9	10.4	10.9	10.8

Interval #2 Information 2

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	840	761	785	775	744	785	824
Vehs Exited	836	760	786	755	739	768	771
Starting Vehs	69	63	51	59	49	54	34
Ending Vehs	73	64	50	79	54	71	87
Travel Distance (mi)	271	246	252	245	241	250	257
Travel Time (hr)	23.3	16.6	18.8	16.3	16.8	22.5	21.1
Total Delay (hr)	15.4	9.5	11.5	9.2	9.8	15.3	13.7
Total Stops	683	546	554	513	545	537	611
Fuel Used (gal)	14.2	11.8	12.6	11.6	11.7	13.3	13.1

Interval #2 Information 2

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	810	757	811	790
Vehs Exited	814	736	791	775
Starting Vehs	52	47	48	52
Ending Vehs	48	68	68	66
Travel Distance (mi)	264	240	258	252
Travel Time (hr)	20.7	15.8	19.9	19.2
Total Delay (hr)	13.1	8.9	12.5	11.9
Total Stops	630	489	575	567
Fuel Used (gal)	13.3	11.2	12.8	12.6

Interval #3 Information 3

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	705	713	688	733	680	742	749
Vehs Exited	727	725	696	757	696	737	765
Starting Vehs	73	64	50	79	54	71	87
Ending Vehs	51	52	42	55	38	76	71
Travel Distance (mi)	234	230	224	243	223	241	243
Travel Time (hr)	18.8	16.1	14.5	18.1	13.5	23.3	21.3
Total Delay (hr)	11.9	9.4	8.0	11.1	7.0	16.4	14.1
Total Stops	508	524	464	497	433	496	524
Fuel Used (gal)	11.6	11.3	10.5	12.0	10.3	13.2	12.8

Interval #3 Information 3

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	713	703	724	716
Vehs Exited	714	724	739	728
Starting Vehs	48	68	68	66
Ending Vehs	47	47	53	53
Travel Distance (mi)	230	233	238	234
Travel Time (hr)	14.7	14.7	17.9	17.3
Total Delay (hr)	8.0	8.0	11.0	10.5
Total Stops	478	443	503	489
Fuel Used (gal)	10.7	10.8	11.8	11.5

Interval #4 Information 4

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	724	709	773	662	714	671	734
Vehs Exited	692	709	767	681	687	694	743
Starting Vehs	51	52	42	55	38	76	71
Ending Vehs	83	52	48	36	65	53	62
Travel Distance (mi)	230	231	250	219	225	224	239
Travel Time (hr)	14.7	16.2	17.4	13.7	17.4	16.0	19.0
Total Delay (hr)	8.0	9.4	10.2	7.3	10.8	9.4	12.1
Total Stops	467	489	547	436	494	465	477
Fuel Used (gal)	10.5	11.0	12.1	10.2	11.1	10.9	12.1

Interval #4 Information 4

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	681	696	708	706
Vehs Exited	683	692	692	704
Starting Vehs	47	47	53	53
Ending Vehs	45	51	69	57
Travel Distance (mi)	222	224	225	229
Travel Time (hr)	15.6	13.7	14.6	15.8
Total Delay (hr)	9.1	7.2	8.0	9.2
Total Stops	494	438	460	477
Fuel Used (gal)	10.8	10.3	10.8	11.0

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	T
Maximum Queue (ft)	229	398	402	309	301	294	236	34	502	758	80	93
Average Queue (ft)	28	321	286	79	170	161	129	10	266	431	26	31
95th Queue (ft)	123	420	389	300	278	251	218	32	534	796	65	70
Link Distance (ft)		309	309			714	714		874	874	446	446
Upstream Blk Time (%)		11	4	0					2	3		
Queuing Penalty (veh)		72	28	0					0	0		
Storage Bay Dist (ft)	230			310	345			280				
Storage Blk Time (%)	0	23	4	0	0	0	0			59		1
Queuing Penalty (veh)	0	4	8	2	1	0	0			149		0

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

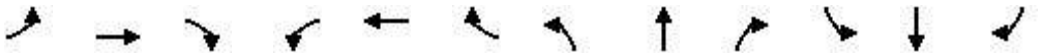
Movement	SB
Directions Served	R
Maximum Queue (ft)	49
Average Queue (ft)	8
95th Queue (ft)	32
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	90
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3: Garrisonville Rd & RIRO Dwy

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	191	158	47
Average Queue (ft)	26	14	19
95th Queue (ft)	114	87	42
Link Distance (ft)	562	562	380
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 264

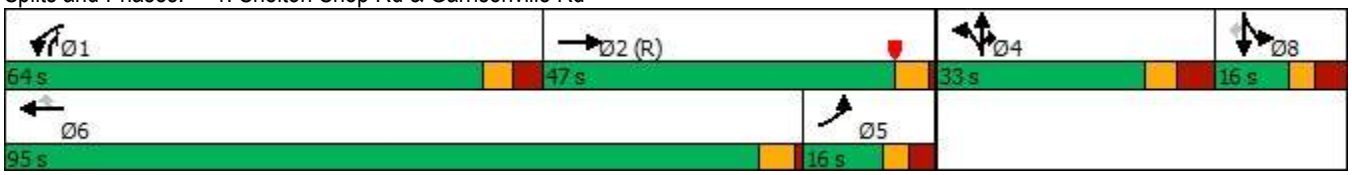


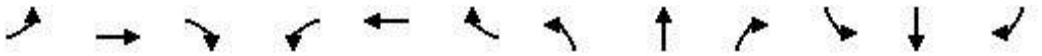
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	848	360	644	1321	61	193	41	343	37	73	32
Future Volume (vph)	30	848	360	644	1321	61	193	41	343	37	73	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	11	12	11	11	11	11	11	12
Grade (%)		4%			0%			3%			4%	
Storage Length (ft)	230		310	345		280	0		90	0		90
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (ft)	0			0			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			35			30	
Link Distance (ft)		383			756			661			516	
Travel Time (s)		6.5			12.9			12.9			11.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	4%	2%	2%	2%	4%	2%	2%	3%	2%	3%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Free	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	5	2		1	6		4	4	4 1	8	8	
Permitted Phases			Free			6						8
Minimum Split (s)	13.0	36.0		14.0	36.0	36.0	16.0	16.0		15.0	15.0	15.0
Total Split (s)	16.0	47.0		64.0	95.0	95.0	33.0	33.0		16.0	16.0	16.0
Total Split (%)	10.0%	29.4%		40.0%	59.4%	59.4%	20.6%	20.6%		10.0%	10.0%	10.0%
Maximum Green (s)	9.5	42.0		57.0	89.8	89.8	24.8	24.8		8.9	8.9	8.9
Yellow Time (s)	3.2	4.0		3.4	4.2	4.2	3.7	3.7		3.0	3.0	3.0
All-Red Time (s)	3.3	1.0		3.6	1.0	1.0	4.5	4.5		4.1	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	5.0		7.0	5.2	5.2		8.2		7.1	7.1	7.1
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Minimum Gap (s)	3.0	4.5		3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
Time Before Reduce (s)	0.0	35.0		0.0	35.0	35.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	1.0		0.0	1.0	1.0	0.0	0.0		0.0	0.0	0.0
Walk Time (s)		7.0			7.0	7.0						
Flash Dont Walk (s)		22.0			22.0	22.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	9.5	42.0	160.0	57.0	89.8	89.8		24.8	80.6	8.9	8.9	8.9
Actuated g/C Ratio	0.06	0.26	1.00	0.36	0.56	0.56		0.16	0.50	0.06	0.06	0.06
v/c Ratio	0.34	1.05	0.26	1.15	0.75	0.07		0.98	0.26	0.43	0.81	0.15
Control Delay	82.2	99.3	0.4	130.7	29.6	0.1		118.0	7.5	88.1	122.3	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	82.2	99.3	0.4	130.7	29.6	0.1		118.0	7.5	88.1	122.3	1.3
LOS	F	F	A	F	C	A		F	A	F	F	A
Approach Delay		70.2			60.9			52.3			85.9	
Approach LOS		E			E			D			F	

Intersection Summary	
Area Type:	Other
Cycle Length: 160	
Actuated Cycle Length: 160	

Offset: 0 (0%), Referenced to phase 2:EBT, Start of Yellow	
Natural Cycle: 145	
Control Type: Pretimed	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 63.4	Intersection LOS: E
Intersection Capacity Utilization 94.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Shelton Shop Rd & Garrisonville Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	848	360	644	1321	61	193	41	343	37	73	32
Future Volume (veh/h)	30	848	360	644	1321	61	193	41	343	37	73	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1746	1776	1746	1870	1870	1870	1788	1817	1817	1761	1776	1761
Adj Flow Rate, veh/h	33	922	0	700	1436	66	210	45	373	40	79	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	2	4	2	2	2	4	2	2	3	2	3
Cap, veh/h	113	878		629	1976	881	221	47	1373	92	98	82
Arrive On Green	0.07	0.26	0.00	0.35	0.56	0.56	0.15	0.15	0.15	0.06	0.06	0.06
Sat Flow, veh/h	1663	3375	1480	1781	3554	1585	1437	308	2711	1677	1776	1493
Grp Volume(v), veh/h	33	922	0	700	1436	66	255	0	373	40	79	35
Grp Sat Flow(s),veh/h/ln	1663	1687	1480	1781	1777	1585	1745	0	1355	1677	1776	1493
Q Serve(g_s), s	3.0	42.0	0.0	57.0	48.6	3.1	23.4	0.0	12.7	3.7	7.1	3.7
Cycle Q Clear(g_c), s	3.0	42.0	0.0	57.0	48.6	3.1	23.4	0.0	12.7	3.7	7.1	3.7
Prop In Lane	1.00		1.00	1.00		1.00	0.82		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	113	878		629	1976	881	268	0	1373	92	98	82
V/C Ratio(X)	0.29	1.05		1.11	0.73	0.07	0.95	0.00	0.27	0.43	0.81	0.43
Avail Cap(c_a), veh/h	113	878		629	1976	881	268	0	1373	92	98	82
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.5	59.8	0.0	52.2	26.7	16.6	67.8	0.0	22.8	73.9	75.5	73.8
Incr Delay (d2), s/veh	6.4	44.5	0.0	71.2	2.4	0.2	43.8	0.0	0.5	14.1	49.1	15.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	23.1	0.0	37.4	20.6	1.2	13.7	0.0	4.3	2.0	4.6	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.9	104.3	0.0	123.4	29.1	16.8	111.5	0.0	23.3	87.9	124.6	89.1
LnGrp LOS	E	F		F	C	B	F	A	C	F	F	F
Approach Vol, veh/h		955	A		2202			628			154	
Approach Delay, s/veh		103.4			58.7			59.1			107.0	
Approach LOS		F			E			E			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	64.0	48.5		33.0	17.5	95.0		16.0				
Change Period (Y+Rc), s	7.0	* 6.5		* 8.2	6.5	5.2		7.1				
Max Green Setting (Gmax), s	57.0	* 42		* 25	9.5	89.8		8.9				
Max Q Clear Time (g_c+I1), s	59.0	44.0		25.4	5.0	50.6		9.1				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	23.4		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		71.5
HCM 6th LOS		E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Volume (vph)	0	1238	1535	11	0	57
Future Volume (vph)	0	1238	1535	11	0	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-4%		0%	
Link Speed (mph)		40	40		30	
Link Distance (ft)		552	383		450	
Travel Time (s)		9.4	6.5		10.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1238	1535	11	0	57
Future Vol, veh/h	0	1238	1535	11	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-4	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1346	1668	12	0	62

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	834
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	311
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	311
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	19.4
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	311
HCM Lane V/C Ratio	-	-	-	0.199
HCM Control Delay (s)	-	-	-	19.4
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.7

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:45	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4008	3778	3992	4001	3814	3792	4001
Vehs Exited	3971	3778	4007	3994	3821	3774	3972
Starting Vehs	96	86	117	117	102	92	86
Ending Vehs	133	86	102	124	95	110	115
Travel Distance (mi)	1245	1180	1254	1252	1194	1186	1249
Travel Time (hr)	248.3	206.9	117.2	190.3	224.3	220.7	181.0
Total Delay (hr)	212.1	172.4	80.8	154.2	189.7	186.0	144.7
Total Stops	3788	2806	3259	3101	2952	2987	3035
Fuel Used (gal)	99.5	86.5	69.6	85.9	91.7	90.2	83.3

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3955	3781	4025	3915
Vehs Exited	3991	3796	4060	3916
Starting Vehs	130	108	131	104
Ending Vehs	94	93	96	104
Travel Distance (mi)	1243	1187	1265	1226
Travel Time (hr)	186.8	263.5	184.9	202.4
Total Delay (hr)	150.7	229.0	148.3	166.8
Total Stops	2989	2916	3625	3145
Fuel Used (gal)	84.3	100.3	85.7	87.7

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information 1

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1062	958	1016	964	994	966	959
Vehs Exited	1012	958	1044	998	996	970	950
Starting Vehs	96	86	117	117	102	92	86
Ending Vehs	146	86	89	83	100	88	95
Travel Distance (mi)	321	298	322	307	310	302	298
Travel Time (hr)	33.3	28.1	26.2	32.6	37.8	30.8	35.9
Total Delay (hr)	24.1	19.5	16.8	23.7	28.9	22.0	27.2
Total Stops	917	659	795	726	795	707	693
Fuel Used (gal)	18.7	16.4	17.1	17.7	19.1	17.1	18.0

Interval #1 Information 1

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1044	939	1019	993
Vehs Exited	1083	963	1033	1000
Starting Vehs	130	108	131	104
Ending Vehs	91	84	117	97
Travel Distance (mi)	332	297	320	311
Travel Time (hr)	26.6	28.9	33.8	31.4
Total Delay (hr)	17.0	20.3	24.6	22.4
Total Stops	785	687	879	766
Fuel Used (gal)	17.2	16.5	18.6	17.6

Interval #2 Information 2

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1011	949	1011	999	968	1020	1068
Vehs Exited	1005	937	992	967	958	979	1051
Starting Vehs	146	86	89	83	100	88	95
Ending Vehs	152	98	108	115	110	129	112
Travel Distance (mi)	313	297	314	309	303	312	335
Travel Time (hr)	59.5	43.8	28.6	49.6	44.1	53.3	43.4
Total Delay (hr)	50.3	35.1	19.6	40.6	35.4	44.1	33.7
Total Stops	1031	762	814	700	747	886	815
Fuel Used (gal)	24.4	19.9	17.2	21.7	20.4	22.7	21.4

Interval #2 Information 2

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	990	932	997	996
Vehs Exited	988	901	966	973
Starting Vehs	91	84	117	97
Ending Vehs	93	115	148	116
Travel Distance (mi)	312	284	302	308
Travel Time (hr)	45.4	53.8	43.7	46.5
Total Delay (hr)	36.3	45.4	34.9	37.5
Total Stops	809	753	1000	832
Fuel Used (gal)	20.9	21.9	20.4	21.1

Interval #3 Information 3

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	974	961	960	1009	898	897	958
Vehs Exited	1022	952	961	1010	926	924	977
Starting Vehs	152	98	108	115	110	129	112
Ending Vehs	104	107	107	114	82	102	93
Travel Distance (mi)	316	295	300	314	285	285	301
Travel Time (hr)	72.1	65.3	30.1	55.5	59.8	60.8	48.6
Total Delay (hr)	62.9	56.7	21.4	46.5	51.5	52.5	39.8
Total Stops	988	764	865	820	715	759	776
Fuel Used (gal)	27.5	24.8	17.1	23.3	23.3	23.5	21.1

Interval #3 Information 3

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	928	906	1014	950
Vehs Exited	910	936	1045	966
Starting Vehs	93	115	148	116
Ending Vehs	111	85	117	102
Travel Distance (mi)	285	289	326	300
Travel Time (hr)	53.7	86.9	55.1	58.8
Total Delay (hr)	45.4	78.5	45.6	50.1
Total Stops	686	737	981	810
Fuel Used (gal)	21.6	29.7	23.8	23.6

Interval #4 Information 4

Start Time	5:45
End Time	6:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	961	910	1005	1029	954	909	1016
Vehs Exited	932	931	1010	1019	941	901	994
Starting Vehs	104	107	107	114	82	102	93
Ending Vehs	133	86	102	124	95	110	115
Travel Distance (mi)	295	290	318	322	296	286	315
Travel Time (hr)	83.3	69.7	32.3	52.6	82.5	75.8	53.1
Total Delay (hr)	74.7	61.2	23.0	43.4	73.9	67.4	44.0
Total Stops	852	621	785	855	695	635	751
Fuel Used (gal)	28.9	25.4	18.2	23.2	28.9	26.8	22.8

Interval #4 Information 4

Start Time	5:45
End Time	6:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	993	1004	995	977
Vehs Exited	1010	996	1016	976
Starting Vehs	111	85	117	102
Ending Vehs	94	93	96	104
Travel Distance (mi)	315	316	317	307
Travel Time (hr)	61.1	94.0	52.3	65.7
Total Delay (hr)	52.0	84.9	43.1	56.8
Total Stops	709	739	765	741
Fuel Used (gal)	24.7	32.3	22.9	25.4

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	T
Maximum Queue (ft)	228	403	403	304	345	764	723	280	448	219	114	202
Average Queue (ft)	54	366	335	187	343	726	616	48	256	119	36	93
95th Queue (ft)	190	437	430	429	347	760	775	198	429	196	86	180
Link Distance (ft)		304	304			708	708		858	858	451	451
Upstream Blk Time (%)		35	20	1		56	1					
Queuing Penalty (veh)		216	125	0		0	0					
Storage Bay Dist (ft)	230			310	345			280				
Storage Blk Time (%)	0	46	20	1	52	33	14	0		15		19
Queuing Penalty (veh)	0	14	72	6	341	210	8	1		26		6

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	90
Average Queue (ft)	32
95th Queue (ft)	87
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	90
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3: Garrisonville Rd & RIRO Dwy

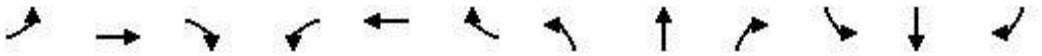
Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	348	332	93
Average Queue (ft)	142	115	30
95th Queue (ft)	394	387	66
Link Distance (ft)	518	518	388
Upstream Blk Time (%)	2	3	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1026

Bowman

Appendix F
No Build (2023) Capacity Analysis

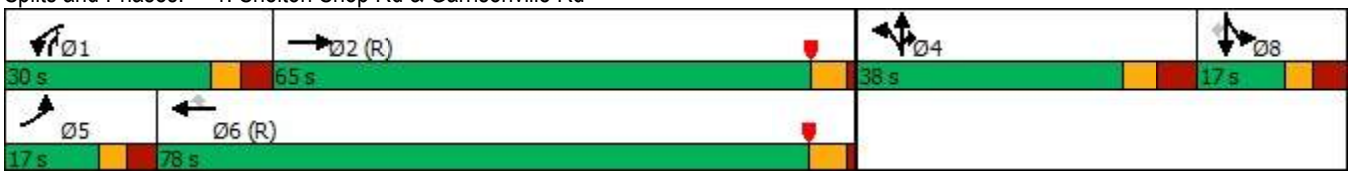


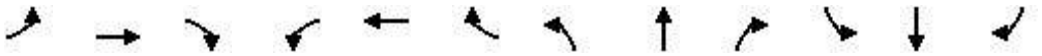
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1056	188	197	606	23	226	31	517	24	29	12
Future Volume (vph)	15	1056	188	197	606	23	226	31	517	24	29	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	11	12	11	11	11	11	11	12
Grade (%)		4%			0%			3%			4%	
Storage Length (ft)	230		310	345		280	0		90	0		90
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (ft)	0			0			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			35			30	
Link Distance (ft)		383			2318			880			512	
Travel Time (s)		6.5			39.5			17.1			11.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	30%	2%	6%	2%	10%	17%	2%	9%	4%	2%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Free	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	5	2		1	6		4	4	4 1	8	8	
Permitted Phases			Free			6						8
Minimum Split (s)	13.0	36.0		14.0	36.0	36.0	16.0	16.0		15.0	15.0	15.0
Total Split (s)	17.0	65.0		30.0	78.0	78.0	38.0	38.0		17.0	17.0	17.0
Total Split (%)	11.3%	43.3%		20.0%	52.0%	52.0%	25.3%	25.3%		11.3%	11.3%	11.3%
Maximum Green (s)	10.5	60.0		23.0	72.8	72.8	29.8	29.8		9.9	9.9	9.9
Yellow Time (s)	3.2	4.0		3.4	4.2	4.2	3.7	3.7		3.0	3.0	3.0
All-Red Time (s)	3.3	1.0		3.6	1.0	1.0	4.5	4.5		4.1	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	5.0		7.0	5.2	5.2		8.2		7.1	7.1	7.1
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Minimum Gap (s)	3.0	4.5		3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
Time Before Reduce (s)	0.0	35.0		0.0	35.0	35.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	1.0		0.0	1.0	1.0	0.0	0.0		0.0	0.0	0.0
Walk Time (s)		7.0			7.0	7.0						
Flash Dont Walk (s)		22.0			22.0	22.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	10.5	60.0	150.0	23.0	72.8	72.8		29.8	51.6	9.9	9.9	9.9
Actuated g/C Ratio	0.07	0.40	1.00	0.15	0.49	0.49		0.20	0.34	0.07	0.07	0.07
v/c Ratio	0.14	0.86	0.17	0.82	0.41	0.03		0.90	0.54	0.25	0.28	0.05
Control Delay	68.4	49.4	0.3	85.4	25.8	0.1		89.9	17.4	73.0	73.4	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	68.4	49.4	0.3	85.4	25.8	0.1		89.9	17.4	73.0	73.4	0.3
LOS	E	D	A	F	C	A		F	B	E	E	A
Approach Delay		42.3			39.3			41.5			59.9	
Approach LOS		D			D			D			E	

Intersection Summary	
Area Type:	Other
Cycle Length: 150	
Actuated Cycle Length: 150	

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 41.6 Intersection LOS: D
Intersection Capacity Utilization 77.8% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Shelton Shop Rd & Garrisonville Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	1056	188	197	606	23	226	31	517	24	29	12
Future Volume (veh/h)	15	1056	188	197	606	23	226	31	517	24	29	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1776	1761	1361	1870	1811	1870	1699	1595	1817	1672	1746	1776
Adj Flow Rate, veh/h	16	1148	0	214	659	25	246	34	562	26	32	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	30	2	6	2	10	17	2	9	4	2
Cap, veh/h	118	1337		273	1672	770	266	37	953	105	115	99
Arrive On Green	0.07	0.40	0.00	0.15	0.49	0.49	0.20	0.20	0.20	0.07	0.07	0.07
Sat Flow, veh/h	1692	3346	1154	1781	3441	1585	1342	186	2711	1593	1746	1505
Grp Volume(v), veh/h	16	1148	0	214	659	25	280	0	562	26	32	13
Grp Sat Flow(s),veh/h/ln	1692	1673	1154	1781	1721	1585	1528	0	1355	1593	1746	1505
Q Serve(g_s), s	1.3	47.1	0.0	17.4	18.3	1.2	27.0	0.0	25.5	2.3	2.6	1.2
Cycle Q Clear(g_c), s	1.3	47.1	0.0	17.4	18.3	1.2	27.0	0.0	25.5	2.3	2.6	1.2
Prop In Lane	1.00		1.00	1.00		1.00	0.88		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	1337		273	1672	770	303	0	953	105	115	99
V/C Ratio(X)	0.14	0.86		0.78	0.39	0.03	0.92	0.00	0.59	0.25	0.28	0.13
Avail Cap(c_a), veh/h	118	1337		273	1672	770	303	0	953	105	115	99
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.6	41.2	0.0	61.2	24.5	20.2	59.1	0.0	39.8	66.6	66.7	66.1
Incr Delay (d2), s/veh	2.4	7.3	0.0	19.9	0.7	0.1	35.4	0.0	2.7	5.6	5.9	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	20.3	0.0	9.3	7.5	0.5	13.4	0.0	8.9	1.1	1.4	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.0	48.6	0.0	81.1	25.2	20.2	94.5	0.0	42.5	72.2	72.7	68.8
LnGrp LOS	E	D		F	C	C	F	A	D	E	E	E
Approach Vol, veh/h		1164	A		898			842			71	
Approach Delay, s/veh		48.8			38.4			59.8			71.8	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	30.0	65.2		38.0	17.0	78.2		17.0				
Change Period (Y+Rc), s	7.0	* 5.2		* 8.2	6.5	5.2		7.1				
Max Green Setting (Gmax), s	23.0	* 60		* 30	10.5	72.8		9.9				
Max Q Clear Time (g_c+I1), s	19.4	49.1		29.0	3.3	20.3		4.6				
Green Ext Time (p_c), s	0.2	7.5		0.5	0.0	8.8		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		49.3
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Volume (vph)	0	1259	835	9	0	41
Future Volume (vph)	0	1259	835	9	0	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	12	12
Grade (%)		4%	-4%		0%	
Link Speed (mph)		40	40		30	
Link Distance (ft)		989	383		437	
Travel Time (s)		16.9	6.5		9.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	7%	7%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.1%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1259	835	9	0	41
Future Vol, veh/h	0	1259	835	9	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-4	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	7	7	2	2	2
Mvmt Flow	0	1368	908	10	0	45

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	454
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	553
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	553
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	553
HCM Lane V/C Ratio	-	-	-	0.081
HCM Control Delay (s)	-	-	-	12.1
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	2972	2899	3035	2976	2921	2918	2952
Vehs Exited	2982	2902	3023	2985	2941	2892	2972
Starting Vehs	91	73	90	98	99	76	106
Ending Vehs	81	70	102	89	79	102	86
Travel Distance (mi)	1826	1781	1861	1839	1807	1786	1816
Travel Time (hr)	93.9	93.0	90.8	88.8	84.3	85.2	95.9
Total Delay (hr)	44.3	44.5	40.4	38.9	35.2	36.8	46.4
Total Stops	2116	2040	2149	2076	1971	2067	2075
Fuel Used (gal)	69.1	67.3	69.1	67.5	66.0	65.6	69.5

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	2927	2925	2919	2944
Vehs Exited	2913	2915	2951	2947
Starting Vehs	92	75	112	89
Ending Vehs	106	85	80	87
Travel Distance (mi)	1791	1791	1812	1811
Travel Time (hr)	100.9	87.5	89.8	91.0
Total Delay (hr)	52.1	38.8	40.6	41.8
Total Stops	2085	1997	2017	2058
Fuel Used (gal)	69.5	66.5	67.2	67.7

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	712	713	721	720	744	674	680
Vehs Exited	714	700	732	727	740	672	694
Starting Vehs	91	73	90	98	99	76	106
Ending Vehs	89	86	79	91	103	78	92
Travel Distance (mi)	440	437	451	451	459	414	424
Travel Time (hr)	20.7	20.0	20.2	22.3	21.3	19.6	20.5
Total Delay (hr)	8.7	8.1	8.2	10.1	8.9	8.3	8.9
Total Stops	491	456	478	502	487	470	471
Fuel Used (gal)	16.3	15.9	16.3	16.6	16.6	15.1	15.9

Interval #1 Information 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	699	704	681	705
Vehs Exited	704	693	720	709
Starting Vehs	92	75	112	89
Ending Vehs	87	86	73	86
Travel Distance (mi)	430	420	437	436
Travel Time (hr)	23.5	19.9	23.7	21.2
Total Delay (hr)	11.7	8.5	11.8	9.3
Total Stops	489	470	473	478
Fuel Used (gal)	16.7	15.4	16.7	16.1

Interval #2 Information 2

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	823	783	812	792	762	793	797
Vehs Exited	787	761	783	780	776	782	765
Starting Vehs	89	86	79	91	103	78	92
Ending Vehs	125	108	108	103	89	89	124
Travel Distance (mi)	487	473	487	487	475	484	472
Travel Time (hr)	26.0	25.0	23.3	23.5	22.2	23.3	25.4
Total Delay (hr)	12.8	12.1	10.2	10.2	9.2	10.3	12.5
Total Stops	599	565	556	553	496	572	560
Fuel Used (gal)	18.7	17.8	18.0	18.1	17.3	18.0	18.1

Interval #2 Information 2

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	804	796	825	799
Vehs Exited	754	763	810	776
Starting Vehs	87	86	73	86
Ending Vehs	137	119	88	107
Travel Distance (mi)	475	482	505	483
Travel Time (hr)	29.6	24.1	25.6	24.8
Total Delay (hr)	16.7	11.0	12.0	11.7
Total Stops	576	546	613	564
Fuel Used (gal)	19.0	18.0	18.9	18.2

Interval #3 Information 3

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	721	729	713	746	687	749	746
Vehs Exited	743	724	728	757	689	722	761
Starting Vehs	125	108	108	103	89	89	124
Ending Vehs	103	113	93	92	87	116	109
Travel Distance (mi)	449	442	446	461	428	449	466
Travel Time (hr)	24.4	23.7	23.9	21.6	19.7	21.3	27.8
Total Delay (hr)	12.2	11.6	11.7	9.1	8.1	9.2	15.1
Total Stops	517	529	532	511	467	522	520
Fuel Used (gal)	17.0	16.9	17.1	16.9	15.7	16.3	18.4

Interval #3 Information 3

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	720	719	709	724
Vehs Exited	768	758	717	737
Starting Vehs	137	119	88	107
Ending Vehs	89	80	80	95
Travel Distance (mi)	457	461	435	449
Travel Time (hr)	26.9	22.3	20.4	23.2
Total Delay (hr)	14.3	9.9	8.5	11.0
Total Stops	531	504	476	509
Fuel Used (gal)	18.0	17.2	15.8	16.9

Interval #4 Information 4

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	716	674	789	718	728	702	729
Vehs Exited	738	717	780	721	736	716	752
Starting Vehs	103	113	93	92	87	116	109
Ending Vehs	81	70	102	89	79	102	86
Travel Distance (mi)	449	428	477	441	446	439	454
Travel Time (hr)	22.8	24.4	23.3	21.4	21.1	21.0	22.2
Total Delay (hr)	10.6	12.7	10.3	9.5	9.0	9.0	9.8
Total Stops	509	490	583	510	521	503	524
Fuel Used (gal)	17.1	16.8	17.7	15.9	16.4	16.2	17.1

Interval #4 Information 4

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	704	706	704	717
Vehs Exited	687	701	704	725
Starting Vehs	89	80	80	95
Ending Vehs	106	85	80	87
Travel Distance (mi)	428	428	435	442
Travel Time (hr)	21.0	21.1	20.1	21.8
Total Delay (hr)	9.3	9.4	8.3	9.8
Total Stops	489	477	455	506
Fuel Used (gal)	15.8	15.9	15.8	16.5

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	T
Maximum Queue (ft)	229	394	398	309	291	273	267	87	579	699	87	100
Average Queue (ft)	30	315	292	96	171	150	154	12	281	427	24	31
95th Queue (ft)	130	410	391	331	274	237	244	62	543	755	64	76
Link Distance (ft)		309	309			2270	2270		836	836	445	445
Upstream Blk Time (%)		10	5	0					1	3		
Queuing Penalty (veh)		64	32	0					0	0		
Storage Bay Dist (ft)	230			310	345			280				
Storage Blk Time (%)	0	22	5	0		0	0	0		59		2
Queuing Penalty (veh)	0	3	10	2		0	0	0		154		0

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

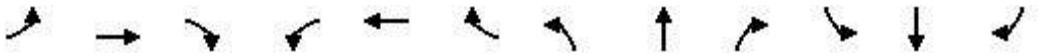
Movement	SB
Directions Served	R
Maximum Queue (ft)	28
Average Queue (ft)	7
95th Queue (ft)	26
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	90
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Garrisonville Rd & RIRO Dwy

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	158	143	57
Average Queue (ft)	15	9	21
95th Queue (ft)	75	62	45
Link Distance (ft)	956	956	380
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 266

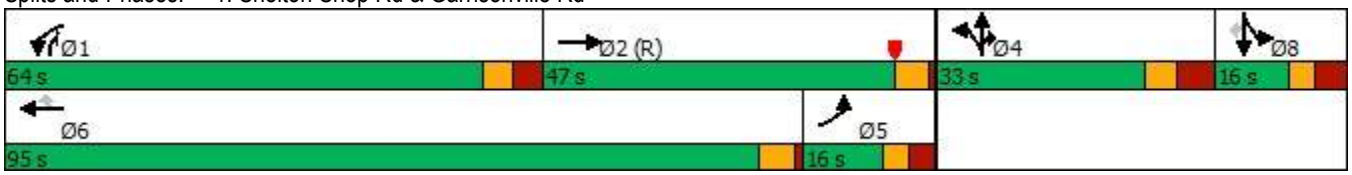


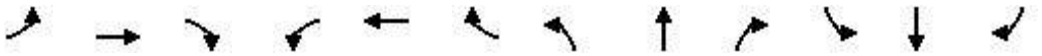
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	865	367	657	1347	61	197	41	350	37	73	32
Future Volume (vph)	30	865	367	657	1347	61	197	41	350	37	73	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	11	12	11	11	11	11	11	12
Grade (%)		4%			0%			3%			4%	
Storage Length (ft)	230		310	345		280	0		90	0		90
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (ft)	0			0			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			35			30	
Link Distance (ft)		383			2072			1116			516	
Travel Time (s)		6.5			35.3			21.7			11.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	4%	2%	2%	2%	4%	2%	2%	3%	2%	3%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Free	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	5	2		1	6		4	4	4 1	8	8	
Permitted Phases			Free			6						8
Minimum Split (s)	13.0	36.0		14.0	36.0	36.0	16.0	16.0		15.0	15.0	15.0
Total Split (s)	16.0	47.0		64.0	95.0	95.0	33.0	33.0		16.0	16.0	16.0
Total Split (%)	10.0%	29.4%		40.0%	59.4%	59.4%	20.6%	20.6%		10.0%	10.0%	10.0%
Maximum Green (s)	9.5	42.0		57.0	89.8	89.8	24.8	24.8		8.9	8.9	8.9
Yellow Time (s)	3.2	4.0		3.4	4.2	4.2	3.7	3.7		3.0	3.0	3.0
All-Red Time (s)	3.3	1.0		3.6	1.0	1.0	4.5	4.5		4.1	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	5.0		7.0	5.2	5.2		8.2		7.1	7.1	7.1
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Minimum Gap (s)	3.0	4.5		3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
Time Before Reduce (s)	0.0	35.0		0.0	35.0	35.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	1.0		0.0	1.0	1.0	0.0	0.0		0.0	0.0	0.0
Walk Time (s)		7.0			7.0	7.0						
Flash Dont Walk (s)		22.0			22.0	22.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	9.5	42.0	160.0	57.0	89.8	89.8		24.8	80.6	8.9	8.9	8.9
Actuated g/C Ratio	0.06	0.26	1.00	0.36	0.56	0.56		0.16	0.50	0.06	0.06	0.06
v/c Ratio	0.34	1.07	0.26	1.17	0.76	0.07		1.00	0.27	0.43	0.81	0.15
Control Delay	82.2	105.0	0.4	138.9	30.3	0.1		121.8	7.7	88.1	122.3	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	82.2	105.0	0.4	138.9	30.3	0.1		121.8	7.7	88.1	122.3	1.3
LOS	F	F	A	F	C	A		F	A	F	F	A
Approach Delay		74.1			63.9			53.9			85.9	
Approach LOS		E			E			D			F	

Intersection Summary	
Area Type:	Other
Cycle Length: 160	
Actuated Cycle Length: 160	

Offset: 0 (0%), Referenced to phase 2:EBT, Start of Yellow
Natural Cycle: 145
Control Type: Pretimed
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 66.4 Intersection LOS: E
Intersection Capacity Utilization 96.2% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: Shelton Shop Rd & Garrisonville Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	865	367	657	1347	61	197	41	350	37	73	32
Future Volume (veh/h)	30	865	367	657	1347	61	197	41	350	37	73	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1746	1776	1746	1870	1870	1870	1788	1817	1817	1761	1776	1761
Adj Flow Rate, veh/h	33	940	0	714	1464	66	214	45	380	40	79	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	2	4	2	2	2	4	2	2	3	2	3
Cap, veh/h	113	878		629	1976	881	221	47	1373	92	98	82
Arrive On Green	0.07	0.26	0.00	0.35	0.56	0.56	0.15	0.15	0.15	0.06	0.06	0.06
Sat Flow, veh/h	1663	3375	1480	1781	3554	1585	1442	303	2711	1677	1776	1493
Grp Volume(v), veh/h	33	940	0	714	1464	66	259	0	380	40	79	35
Grp Sat Flow(s),veh/h/ln	1663	1687	1480	1781	1777	1585	1745	0	1355	1677	1776	1493
Q Serve(g_s), s	3.0	42.0	0.0	57.0	50.2	3.1	23.8	0.0	13.0	3.7	7.1	3.7
Cycle Q Clear(g_c), s	3.0	42.0	0.0	57.0	50.2	3.1	23.8	0.0	13.0	3.7	7.1	3.7
Prop In Lane	1.00		1.00	1.00		1.00	0.83		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	113	878		629	1976	881	268	0	1373	92	98	82
V/C Ratio(X)	0.29	1.07		1.14	0.74	0.07	0.97	0.00	0.28	0.43	0.81	0.43
Avail Cap(c_a), veh/h	113	878		629	1976	881	268	0	1373	92	98	82
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.5	59.8	0.0	52.2	27.1	16.6	67.9	0.0	22.9	73.9	75.5	73.8
Incr Delay (d2), s/veh	6.4	51.3	0.0	79.5	2.5	0.2	47.0	0.0	0.5	14.1	49.1	15.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	23.9	0.0	38.8	21.3	1.2	14.1	0.0	4.3	2.0	4.6	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.9	111.0	0.0	131.7	29.6	16.8	114.9	0.0	23.4	87.9	124.6	89.1
LnGrp LOS	E	F		F	C	B	F	A	C	F	F	F
Approach Vol, veh/h		973	A		2244			639			154	
Approach Delay, s/veh		109.9			61.7			60.5			107.0	
Approach LOS		F			E			E			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	64.0	48.5		33.0	17.5	95.0		16.0				
Change Period (Y+Rc), s	7.0	* 6.5		* 8.2	6.5	5.2		7.1				
Max Green Setting (Gmax), s	57.0	* 42		* 25	9.5	89.8		8.9				
Max Q Clear Time (g_c+I1), s	59.0	44.0		25.8	5.0	52.2		9.1				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	23.4		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		75.0	
HCM 6th LOS		E	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Volume (vph)	0	1262	1565	11	0	57
Future Volume (vph)	0	1262	1565	11	0	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-4%		0%	
Link Speed (mph)		40	40		30	
Link Distance (ft)		1110	383		450	
Travel Time (s)		18.9	6.5		10.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.5%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1262	1565	11	0	57
Future Vol, veh/h	0	1262	1565	11	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-4	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1372	1701	12	0	62

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	851
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	303
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	303
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	19.9
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	303
HCM Lane V/C Ratio	-	-	-	0.204
HCM Control Delay (s)	-	-	-	19.9
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.8

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:45	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4112	3945	3953	4038	4061	3998	4079
Vehs Exited	4070	3944	3924	3987	4010	3930	4052
Starting Vehs	154	138	171	182	147	135	175
Ending Vehs	196	139	200	233	198	203	202
Travel Distance (mi)	2458	2381	2354	2409	2418	2379	2441
Travel Time (hr)	226.8	137.7	197.1	227.8	175.1	207.1	203.4
Total Delay (hr)	159.7	72.7	132.5	162.3	109.1	142.1	136.8
Total Stops	5216	3481	4724	4947	4574	4509	5206
Fuel Used (gal)	118.6	93.6	109.8	117.9	105.3	111.6	112.8

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4091	4031	3955	4025
Vehs Exited	4056	3994	3916	3989
Starting Vehs	164	164	155	158
Ending Vehs	199	201	194	196
Travel Distance (mi)	2446	2411	2362	2406
Travel Time (hr)	199.0	232.1	296.6	210.3
Total Delay (hr)	132.2	166.4	231.9	144.6
Total Stops	4856	4930	5009	4744
Fuel Used (gal)	111.6	119.6	132.6	113.4

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information 1

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1038	911	1012	1009	970	1018	954
Vehs Exited	1042	936	1003	1023	1002	1021	974
Starting Vehs	154	138	171	182	147	135	175
Ending Vehs	150	113	180	168	115	132	155
Travel Distance (mi)	630	563	603	612	599	616	578
Travel Time (hr)	36.5	27.4	41.2	41.4	33.5	35.3	38.2
Total Delay (hr)	19.3	12.0	24.6	24.7	17.2	18.5	22.4
Total Stops	972	592	1059	1150	831	871	945
Fuel Used (gal)	24.8	20.8	25.9	25.7	23.6	24.5	23.9

Interval #1 Information 1

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1011	1004	994	992
Vehs Exited	1040	1010	985	1003
Starting Vehs	164	164	155	158
Ending Vehs	135	158	164	146
Travel Distance (mi)	620	605	592	602
Travel Time (hr)	37.9	38.4	36.9	36.7
Total Delay (hr)	21.0	21.9	20.7	20.2
Total Stops	967	1039	941	938
Fuel Used (gal)	25.2	24.9	24.2	24.3

Interval #2 Information 2

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1152	1062	1024	1061	1082	1129	1108
Vehs Exited	1046	1031	988	1029	1014	1065	1044
Starting Vehs	150	113	180	168	115	132	155
Ending Vehs	256	144	216	200	183	196	219
Travel Distance (mi)	639	625	592	620	622	647	634
Travel Time (hr)	51.5	35.6	47.9	51.4	41.2	48.0	49.0
Total Delay (hr)	34.1	18.5	31.7	34.5	24.3	30.3	31.7
Total Stops	1473	912	1263	1327	1147	1285	1485
Fuel Used (gal)	28.7	24.7	27.2	28.9	25.9	28.3	28.2

Interval #2 Information 2

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1152	1028	1032	1084
Vehs Exited	1071	985	974	1024
Starting Vehs	135	158	164	146
Ending Vehs	216	201	222	204
Travel Distance (mi)	657	587	588	621
Travel Time (hr)	48.0	50.3	56.6	48.0
Total Delay (hr)	30.1	34.3	40.4	31.0
Total Stops	1471	1212	1174	1274
Fuel Used (gal)	28.2	27.7	29.1	27.7

Interval #3 Information 3

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	978	1008	972	965	998	923	996
Vehs Exited	1011	995	1008	970	983	928	1022
Starting Vehs	256	144	216	200	183	196	219
Ending Vehs	223	157	180	195	198	191	193
Travel Distance (mi)	602	604	597	580	594	552	608
Travel Time (hr)	68.3	38.9	49.1	57.2	45.5	49.9	54.7
Total Delay (hr)	51.9	22.5	32.7	41.4	29.3	34.8	38.1
Total Stops	1568	1086	1233	1098	1211	1124	1389
Fuel Used (gal)	32.5	24.6	27.6	28.9	26.6	26.3	29.3

Interval #3 Information 3

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	965	978	989	978
Vehs Exited	998	967	973	986
Starting Vehs	216	201	222	204
Ending Vehs	183	212	238	196
Travel Distance (mi)	588	591	591	591
Travel Time (hr)	47.8	65.5	96.6	57.4
Total Delay (hr)	31.7	49.4	80.3	41.2
Total Stops	1213	1255	1505	1269
Fuel Used (gal)	27.0	31.6	38.5	29.3

Interval #4 Information 4

Start Time	5:45
End Time	6:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	944	964	945	1003	1011	928	1021
Vehs Exited	971	982	925	965	1011	916	1012
Starting Vehs	223	157	180	195	198	191	193
Ending Vehs	196	139	200	233	198	203	202
Travel Distance (mi)	587	589	562	597	603	563	621
Travel Time (hr)	70.4	35.6	58.9	77.9	54.8	73.9	61.5
Total Delay (hr)	54.4	19.6	43.5	61.6	38.4	58.5	44.6
Total Stops	1203	891	1169	1372	1385	1229	1387
Fuel Used (gal)	32.7	23.5	29.1	34.4	29.2	32.5	31.4

Interval #4 Information 4

Start Time	5:45
End Time	6:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	963	1021	940	973
Vehs Exited	947	1032	984	975
Starting Vehs	183	212	238	196
Ending Vehs	199	201	194	196
Travel Distance (mi)	581	628	590	592
Travel Time (hr)	65.3	77.9	106.5	68.3
Total Delay (hr)	49.4	60.7	90.4	52.1
Total Stops	1205	1424	1389	1263
Fuel Used (gal)	31.2	35.4	40.9	32.0

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	T
Maximum Queue (ft)	229	403	415	304	345	1990	1969	280	480	242	96	208
Average Queue (ft)	52	366	349	217	342	1589	1549	71	274	119	39	98
95th Queue (ft)	180	432	442	442	372	2440	2416	254	461	205	86	187
Link Distance (ft)		304	304			2022	2022		1070	1070	451	451
Upstream Blk Time (%)		33	23	2		30	10					
Queuing Penalty (veh)		211	146	0		0	0					
Storage Bay Dist (ft)	230			310	345			280				
Storage Blk Time (%)	0	44	23	2	57	50	12	0		15		21
Queuing Penalty (veh)	0	13	85	7	385	329	8	2		27		7

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	90
Average Queue (ft)	36
95th Queue (ft)	92
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	90
Storage Blk Time (%)	1
Queuing Penalty (veh)	0

Intersection: 3: Garrisonville Rd & RIRO Dwy

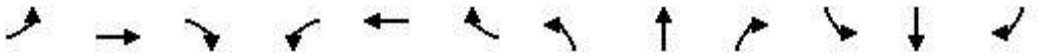
Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	348	381	105
Average Queue (ft)	121	115	30
95th Queue (ft)	345	362	69
Link Distance (ft)	1076	1076	388
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1220

Bowman

Appendix G
Build (2023) Capacity Analysis



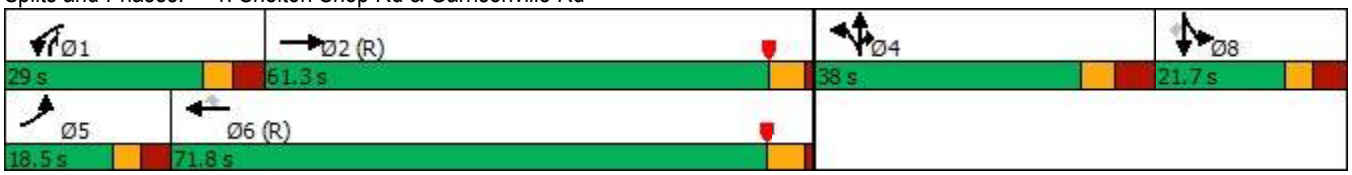
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1034	184	196	616	41	221	59	506	82	45	12
Future Volume (vph)	62	1034	184	196	616	41	221	59	506	82	45	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	11	12	11	11	11	11	11	12
Grade (%)		3%			0%			1%			4%	
Storage Length (ft)	230		310	345		280	0		90	0		90
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (ft)	0			0			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			35			30	
Link Distance (ft)		383			2221			1334			512	
Travel Time (s)		6.5			37.9			26.0			11.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	30%	2%	6%	2%	10%	17%	2%	9%	4%	2%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Free	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	5	2		1	6		4	4	4 1	8	8	
Permitted Phases			Free			6						8
Minimum Split (s)	13.0	36.0		14.0	36.0	36.0	16.0	16.0		15.0	15.0	15.0
Total Split (s)	18.5	61.3		29.0	71.8	71.8	38.0	38.0		21.7	21.7	21.7
Total Split (%)	12.3%	40.9%		19.3%	47.9%	47.9%	25.3%	25.3%		14.5%	14.5%	14.5%
Maximum Green (s)	12.0	56.3		22.0	66.6	66.6	29.8	29.8		14.6	14.6	14.6
Yellow Time (s)	3.2	4.0		3.4	4.2	4.2	3.7	3.7		3.0	3.0	3.0
All-Red Time (s)	3.3	1.0		3.6	1.0	1.0	4.5	4.5		4.1	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	5.0		7.0	5.2	5.2		8.2		7.1	7.1	7.1
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Minimum Gap (s)	3.0	4.5		3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
Time Before Reduce (s)	0.0	35.0		0.0	35.0	35.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	1.0		0.0	1.0	1.0	0.0	0.0		0.0	0.0	0.0
Walk Time (s)		7.0			7.0	7.0						
Flash Dont Walk (s)		22.0			22.0	22.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	12.0	56.3	150.0	22.0	66.6	66.6		29.8	50.6	14.6	14.6	14.6
Actuated g/C Ratio	0.08	0.38	1.00	0.15	0.44	0.44		0.20	0.34	0.10	0.10	0.10
v/c Ratio	0.50	0.90	0.16	0.85	0.46	0.06		0.97	0.55	0.59	0.29	0.04
Control Delay	79.6	54.7	0.3	91.2	30.4	0.1		103.0	19.1	81.1	67.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	79.6	54.7	0.3	91.2	30.4	0.1		103.0	19.1	81.1	67.9	0.2
LOS	E	D	A	F	C	A		F	B	F	E	A
Approach Delay		48.1			42.9			48.9			69.9	
Approach LOS		D			D			D			E	

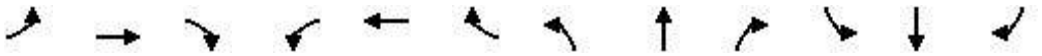
Intersection Summary	
Area Type:	Other
Cycle Length: 150	
Actuated Cycle Length: 150	

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 95	
Control Type: Pretimed	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 47.8	Intersection LOS: D
Intersection Capacity Utilization 78.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Shelton Shop Rd & Garrisonville Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	1034	184	196	616	41	221	59	506	82	45	12
Future Volume (veh/h)	62	1034	184	196	616	41	221	59	506	82	45	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1817	1803	1402	1870	1811	1870	1746	1642	1864	1672	1746	1776
Adj Flow Rate, veh/h	67	1124	0	213	670	45	240	64	550	89	49	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	3	30	2	6	2	10	17	2	9	4	2
Cap, veh/h	138	1284		261	1530	705	247	66	959	155	170	146
Arrive On Green	0.08	0.37	0.00	0.15	0.44	0.44	0.20	0.20	0.20	0.10	0.10	0.10
Sat Flow, veh/h	1731	3425	1188	1781	3441	1585	1247	333	2781	1593	1746	1505
Grp Volume(v), veh/h	67	1124	0	213	670	45	304	0	550	89	49	13
Grp Sat Flow(s),veh/h/ln	1731	1712	1188	1781	1721	1585	1580	0	1390	1593	1746	1505
Q Serve(g_s), s	5.6	45.9	0.0	17.4	20.2	2.4	28.7	0.0	24.3	8.0	3.9	1.2
Cycle Q Clear(g_c), s	5.6	45.9	0.0	17.4	20.2	2.4	28.7	0.0	24.3	8.0	3.9	1.2
Prop In Lane	1.00		1.00	1.00		1.00	0.79		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	1284		261	1530	705	313	0	959	155	170	146
V/C Ratio(X)	0.48	0.88		0.82	0.44	0.06	0.97	0.00	0.57	0.57	0.29	0.09
Avail Cap(c_a), veh/h	138	1284		261	1530	705	313	0	959	155	170	146
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	66.1	43.7	0.0	62.1	28.8	23.8	59.8	0.0	40.2	64.8	63.0	61.7
Incr Delay (d2), s/veh	11.7	8.6	0.0	23.8	0.9	0.2	43.7	0.0	2.5	14.6	4.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	20.6	0.0	9.5	8.4	1.0	15.2	0.0	8.7	3.9	2.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.8	52.2	0.0	86.0	29.7	24.0	103.5	0.0	42.7	79.4	67.2	62.9
LnGrp LOS	E	D		F	C	C	F	A	D	E	E	E
Approach Vol, veh/h		1191	A		928			854			151	
Approach Delay, s/veh		53.7			42.3			64.3			74.1	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	29.0	61.5		38.0	18.5	72.0		21.7				
Change Period (Y+Rc), s	7.0	* 5.2		* 8.2	6.5	5.2		7.1				
Max Green Setting (Gmax), s	22.0	* 56		* 30	12.0	66.6		14.6				
Max Q Clear Time (g_c+I1), s	19.4	47.9		30.7	7.6	22.2		10.0				
Green Ext Time (p_c), s	0.1	5.9		0.0	0.0	9.0		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		54.2
HCM 6th LOS		D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Volume (vph)	0	1280	813	36	0	81
Future Volume (vph)	0	1280	813	36	0	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	12	12
Grade (%)		4%	-4%		0%	
Link Speed (mph)		40	40		30	
Link Distance (ft)		1361	383		437	
Travel Time (s)		23.2	6.5		9.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	7%	7%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1280	813	36	0	81
Future Vol, veh/h	0	1280	813	36	0	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-4	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	7	7	2	2	2
Mvmt Flow	0	1391	884	39	0	88

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	442
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	563
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	563
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.6
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	563
HCM Lane V/C Ratio	-	-	-	0.156
HCM Control Delay (s)	-	-	-	12.6
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.6

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	7:15	7:15	7:15	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	3275	3142	3065	3140	3011	3008	3099
Vehs Exited	3264	3119	3057	3151	3014	3007	3078
Starting Vehs	99	87	97	107	103	91	86
Ending Vehs	110	110	105	96	100	92	107
Travel Distance (mi)	2179	2080	2031	2103	2012	2003	2056
Travel Time (hr)	109.4	112.3	102.3	97.4	94.7	97.6	100.8
Total Delay (hr)	49.7	55.1	46.6	40.3	39.6	42.9	44.5
Total Stops	2477	2365	2294	2239	2193	2198	2301
Fuel Used (gal)	80.2	78.1	74.8	75.4	72.3	72.9	75.0

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	7:15	7:15	7:15	7:15
End Time	8:30	8:30	8:30	8:30
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	3198	3142	3125	3120
Vehs Exited	3184	3168	3135	3117
Starting Vehs	100	124	95	97
Ending Vehs	114	98	85	100
Travel Distance (mi)	2127	2111	2092	2080
Travel Time (hr)	121.0	103.2	101.1	104.0
Total Delay (hr)	62.7	45.6	44.1	47.1
Total Stops	2527	2363	2389	2333
Fuel Used (gal)	81.2	77.1	76.1	76.3

Interval #0 Information Seeding

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	765	753	719	783	722	708	718
Vehs Exited	769	742	729	790	737	722	715
Starting Vehs	99	87	97	107	103	91	86
Ending Vehs	95	98	87	100	88	77	89
Travel Distance (mi)	516	501	482	531	489	474	478
Travel Time (hr)	23.5	23.6	21.6	25.1	22.3	21.6	22.1
Total Delay (hr)	9.5	9.8	8.5	10.7	8.9	8.6	9.0
Total Stops	543	541	489	557	510	484	505
Fuel Used (gal)	18.4	18.0	17.2	19.2	17.5	16.9	17.2

Interval #1 Information 1

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	779	754	754	745
Vehs Exited	752	784	777	753
Starting Vehs	100	124	95	97
Ending Vehs	127	94	72	93
Travel Distance (mi)	507	517	511	501
Travel Time (hr)	24.9	23.5	24.0	23.2
Total Delay (hr)	11.0	9.4	10.0	9.5
Total Stops	566	530	560	529
Fuel Used (gal)	18.5	18.6	18.3	18.0

Interval #2 Information 2

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	908	848	831	789	772	862	826
Vehs Exited	878	821	813	791	778	793	805
Starting Vehs	95	98	87	100	88	77	89
Ending Vehs	125	125	105	98	82	146	110
Travel Distance (mi)	586	551	536	529	524	546	544
Travel Time (hr)	30.3	30.0	25.8	24.5	23.8	28.4	26.2
Total Delay (hr)	14.2	14.9	11.2	10.1	9.5	13.5	11.3
Total Stops	686	668	608	579	548	657	621
Fuel Used (gal)	21.8	20.7	19.4	19.0	18.5	20.1	19.5

Interval #2 Information 2

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	869	862	860	843
Vehs Exited	858	820	795	815
Starting Vehs	127	94	72	93
Ending Vehs	138	136	137	119
Travel Distance (mi)	576	559	547	550
Travel Time (hr)	36.1	28.3	28.4	28.2
Total Delay (hr)	20.3	13.1	13.4	13.1
Total Stops	843	654	687	655
Fuel Used (gal)	22.7	20.6	20.3	20.3

Interval #3 Information 3

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	817	762	728	779	734	723	775
Vehs Exited	828	762	732	799	731	785	778
Starting Vehs	125	125	105	98	82	146	110
Ending Vehs	114	125	101	78	85	84	107
Travel Distance (mi)	553	502	492	525	486	507	516
Travel Time (hr)	27.9	29.1	28.2	24.2	21.8	25.7	24.7
Total Delay (hr)	12.7	15.2	14.7	9.9	8.6	11.9	10.6
Total Stops	619	555	596	551	508	545	565
Fuel Used (gal)	20.4	19.2	18.8	18.8	17.3	18.8	18.6

Interval #3 Information 3

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	763	774	754	760
Vehs Exited	773	802	794	778
Starting Vehs	138	136	137	119
Ending Vehs	128	108	97	102
Travel Distance (mi)	522	530	526	516
Travel Time (hr)	30.6	27.5	25.3	26.5
Total Delay (hr)	16.3	13.1	10.9	12.4
Total Stops	572	618	592	573
Fuel Used (gal)	20.2	19.6	19.2	19.1

Interval #4 Information 4

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	785	779	787	789	783	715	780
Vehs Exited	789	794	783	771	768	707	780
Starting Vehs	114	125	101	78	85	84	107
Ending Vehs	110	110	105	96	100	92	107
Travel Distance (mi)	524	525	521	518	514	476	518
Travel Time (hr)	27.8	29.6	26.6	23.6	26.8	21.9	27.8
Total Delay (hr)	13.3	15.2	12.3	9.6	12.6	8.9	13.6
Total Stops	629	601	601	552	627	512	610
Fuel Used (gal)	19.6	20.1	19.3	18.5	19.0	17.2	19.6

Interval #4 Information 4

Start Time	8:15
End Time	8:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	787	752	757	770
Vehs Exited	801	762	769	772
Starting Vehs	128	108	97	102
Ending Vehs	114	98	85	100
Travel Distance (mi)	522	506	509	513
Travel Time (hr)	29.4	23.9	23.6	26.1
Total Delay (hr)	15.1	10.1	9.7	12.0
Total Stops	546	561	550	576
Fuel Used (gal)	19.8	18.3	18.3	19.0

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	T
Maximum Queue (ft)	230	402	408	309	311	271	268	75	598	730	179	114
Average Queue (ft)	86	320	308	104	173	165	169	17	303	401	75	44
95th Queue (ft)	216	421	408	344	282	240	247	54	539	772	147	95
Link Distance (ft)		309	309			2172	2172		1289	1289	446	446
Upstream Blk Time (%)		12	9	1								
Queuing Penalty (veh)		80	58	0								
Storage Bay Dist (ft)	230			310	345			280				
Storage Blk Time (%)	0	22	9	1	0	0	0			58		4
Queuing Penalty (veh)	1	14	17	3	0	0	0			146		1

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

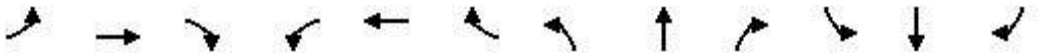
Movement	SB
Directions Served	R
Maximum Queue (ft)	58
Average Queue (ft)	8
95th Queue (ft)	34
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	90
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3: Garrisonville Rd & RIRO Dwy

Movement	EB	EB	SB
Directions Served	T	T	R
Maximum Queue (ft)	163	172	77
Average Queue (ft)	25	20	33
95th Queue (ft)	120	115	59
Link Distance (ft)	1328	1328	380
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 318

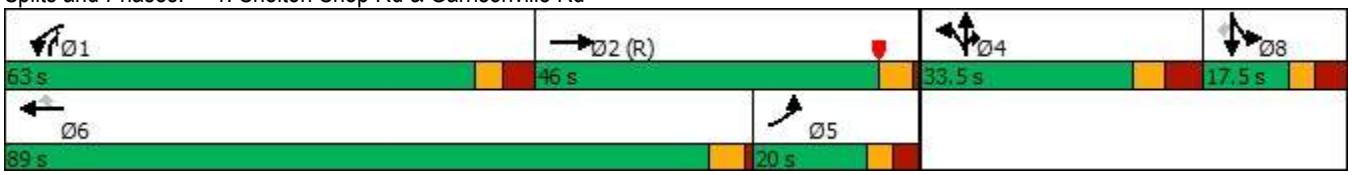


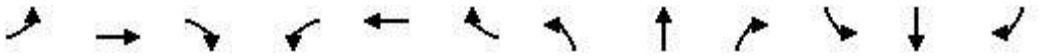
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	846	363	656	1354	73	193	63	340	80	84	32
Future Volume (vph)	67	846	363	656	1354	73	193	63	340	80	84	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	11	11	12	11	11	11	11	11	12
Grade (%)		4%			0%			1%			4%	
Storage Length (ft)	230		310	345		280	0		90	0		90
Storage Lanes	1		1	1		1	0		1	1		1
Taper Length (ft)	0			0			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			35			30	
Link Distance (ft)		383			2019			1235			516	
Travel Time (s)		6.5			34.4			24.1			11.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	2%	4%	2%	2%	2%	4%	2%	2%	3%	2%	3%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Free	Prot	NA	Perm	Split	NA	pt+ov	Split	NA	Perm
Protected Phases	5	2		1	6		4	4	4 1	8	8	
Permitted Phases			Free			6						8
Minimum Split (s)	13.0	36.0		14.0	36.0	36.0	16.0	16.0		15.0	15.0	15.0
Total Split (s)	20.0	46.0		63.0	89.0	89.0	33.5	33.5		17.5	17.5	17.5
Total Split (%)	12.5%	28.8%		39.4%	55.6%	55.6%	20.9%	20.9%		10.9%	10.9%	10.9%
Maximum Green (s)	13.5	41.0		56.0	83.8	83.8	25.3	25.3		10.4	10.4	10.4
Yellow Time (s)	3.2	4.0		3.4	4.2	4.2	3.7	3.7		3.0	3.0	3.0
All-Red Time (s)	3.3	1.0		3.6	1.0	1.0	4.5	4.5		4.1	4.1	4.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Lost Time (s)	6.5	5.0		7.0	5.2	5.2		8.2		7.1	7.1	7.1
Lead/Lag	Lag	Lag		Lead	Lead	Lead						
Lead-Lag Optimize?												
Minimum Gap (s)	3.0	4.5		3.0	4.5	4.5	4.0	4.0		4.0	4.0	4.0
Time Before Reduce (s)	0.0	35.0		0.0	35.0	35.0	0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	1.0		0.0	1.0	1.0	0.0	0.0		0.0	0.0	0.0
Walk Time (s)		7.0			7.0	7.0						
Flash Dont Walk (s)		22.0			22.0	22.0						
Pedestrian Calls (#/hr)		0			0	0						
Act Effct Green (s)	13.5	41.0	160.0	56.0	83.8	83.8		25.3	80.1	10.4	10.4	10.4
Actuated g/C Ratio	0.08	0.26	1.00	0.35	0.52	0.52		0.16	0.50	0.06	0.06	0.06
v/c Ratio	0.53	1.07	0.26	1.19	0.82	0.09		1.03	0.27	0.81	0.80	0.14
Control Delay	84.7	106.6	0.4	146.8	36.7	0.4		127.3	9.4	119.6	115.4	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Total Delay	84.7	106.6	0.4	146.8	36.7	0.4		127.3	9.4	119.6	115.4	1.2
LOS	F	F	A	F	D	A		F	A	F	F	A
Approach Delay		75.3			70.1			60.0			98.3	
Approach LOS		E			E			E			F	

Intersection Summary	
Area Type:	Other
Cycle Length: 160	
Actuated Cycle Length: 160	

Offset: 120.1 (75%), Referenced to phase 2:EBT, Start of Yellow
Natural Cycle: 145
Control Type: Pretimed
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 71.6 Intersection LOS: E
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 1: Shelton Shop Rd & Garrisonville Rd





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	846	363	656	1354	73	193	63	340	80	84	32
Future Volume (veh/h)	67	846	363	656	1354	73	193	63	340	80	84	32
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1746	1776	1746	1870	1870	1870	1835	1864	1864	1761	1776	1761
Adj Flow Rate, veh/h	73	920	0	713	1472	79	210	68	370	87	91	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	2	4	2	2	2	4	2	2	3	2	3
Cap, veh/h	154	857		618	1844	822	213	69	1400	108	114	96
Arrive On Green	0.09	0.25	0.00	0.35	0.52	0.52	0.16	0.16	0.16	0.06	0.06	0.06
Sat Flow, veh/h	1663	3375	1480	1781	3554	1585	1357	439	2781	1677	1776	1493
Grp Volume(v), veh/h	73	920	0	713	1472	79	278	0	370	87	91	35
Grp Sat Flow(s),veh/h/ln	1663	1687	1480	1781	1777	1585	1797	0	1390	1677	1776	1493
Q Serve(g_s), s	6.7	41.0	0.0	56.0	54.9	4.1	24.9	0.0	12.3	8.3	8.2	3.6
Cycle Q Clear(g_c), s	6.7	41.0	0.0	56.0	54.9	4.1	24.9	0.0	12.3	8.3	8.2	3.6
Prop In Lane	1.00		1.00	1.00		1.00	0.76		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	154	857		618	1844	822	281	0	1400	108	114	96
V/C Ratio(X)	0.47	1.07		1.15	0.80	0.10	0.99	0.00	0.26	0.81	0.80	0.36
Avail Cap(c_a), veh/h	154	857		618	1844	822	281	0	1400	108	114	96
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	69.5	60.3	0.0	52.8	31.9	19.7	67.9	0.0	23.0	74.6	74.5	72.4
Incr Delay (d2), s/veh	10.0	52.6	0.0	86.9	3.7	0.2	50.6	0.0	0.5	45.4	42.0	10.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	23.5	0.0	39.4	23.9	1.6	15.4	0.0	4.2	4.9	5.1	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.5	112.8	0.0	139.6	35.6	19.9	118.6	0.0	23.4	120.0	116.5	82.7
LnGrp LOS	E	F		F	D	B	F	A	C	F	F	F
Approach Vol, veh/h		993	A		2264			648			213	
Approach Delay, s/veh		110.4			67.8			64.2			112.4	
Approach LOS		F			E			E			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	63.0	47.5		33.5	21.5	89.0		17.5				
Change Period (Y+Rc), s	7.0	* 6.5		* 8.2	6.5	5.2		7.1				
Max Green Setting (Gmax), s	56.0	* 41		* 25	13.5	83.8		10.4				
Max Q Clear Time (g_c+I1), s	58.0	43.0		26.9	8.7	56.9		10.3				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	18.8		0.0				

Intersection Summary		
HCM 6th Ctrl Delay		79.8
HCM 6th LOS		E

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Volume (vph)	0	1276	1548	31	0	86
Future Volume (vph)	0	1276	1548	31	0	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		4%	-4%		0%	
Link Speed (mph)		40	40		30	
Link Distance (ft)		1300	383		450	
Travel Time (s)		22.2	6.5		10.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1276	1548	31	0	86
Future Vol, veh/h	0	1276	1548	31	0	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-4	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1387	1683	34	0	93

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	842
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	308
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	308
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	21.7
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	308
HCM Lane V/C Ratio	-	-	-	0.304
HCM Control Delay (s)	-	-	-	21.7
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	1.2

Summary of All Intervals

Run Number	1	10	2	3	4	5	6
Start Time	4:45	4:45	4:45	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75	75	75	75
Time Recorded (min)	60	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4	4
Vehs Entered	4275	4198	4009	4181	4067	4210	4241
Vehs Exited	4186	4162	4005	4169	4050	4110	4137
Starting Vehs	152	132	196	212	175	123	166
Ending Vehs	241	168	200	224	192	223	270
Travel Distance (mi)	2602	2585	2482	2581	2513	2565	2585
Travel Time (hr)	318.6	176.4	257.9	312.9	207.6	230.3	239.4
Total Delay (hr)	247.4	105.8	190.1	242.5	138.8	160.2	168.6
Total Stops	6201	4817	5563	6154	5694	5670	6206
Fuel Used (gal)	143.2	108.6	126.6	141.5	115.5	121.7	124.2

Summary of All Intervals

Run Number	7	8	9	Avg
Start Time	4:45	4:45	4:45	4:45
End Time	6:00	6:00	6:00	6:00
Total Time (min)	75	75	75	75
Time Recorded (min)	60	60	60	60
# of Intervals	5	5	5	5
# of Recorded Intervals	4	4	4	4
Vehs Entered	4076	4178	4247	4169
Vehs Exited	4043	4135	4175	4117
Starting Vehs	185	184	175	171
Ending Vehs	218	227	247	222
Travel Distance (mi)	2499	2566	2600	2558
Travel Time (hr)	244.4	229.0	250.5	246.7
Total Delay (hr)	176.0	159.0	179.3	176.8
Total Stops	5380	5998	5906	5757
Fuel Used (gal)	122.9	121.1	126.2	125.2

Interval #0 Information Seeding

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information 1

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1089	1045	1074	1045	1005	1045	1008
Vehs Exited	1014	1042	1036	1047	1024	1012	1030
Starting Vehs	152	132	196	212	175	123	166
Ending Vehs	227	135	234	210	156	156	144
Travel Distance (mi)	640	647	648	645	627	625	632
Travel Time (hr)	51.3	36.4	51.0	51.7	42.6	36.6	39.5
Total Delay (hr)	33.9	18.8	33.4	34.0	25.5	19.6	22.3
Total Stops	1496	908	1526	1542	1110	955	1130
Fuel Used (gal)	28.9	24.9	28.9	28.6	26.3	24.7	25.6

Interval #1 Information 1

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1040	1024	1026	1039
Vehs Exited	1034	1032	1046	1031
Starting Vehs	185	184	175	171
Ending Vehs	191	176	155	180
Travel Distance (mi)	637	636	641	638
Travel Time (hr)	43.8	46.6	44.0	44.3
Total Delay (hr)	26.4	29.2	26.4	26.9
Total Stops	1243	1452	1277	1262
Fuel Used (gal)	26.7	27.4	26.6	26.9

Interval #2 Information 2

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1093	1139	1002	1066	1109	1133	1181
Vehs Exited	1094	1045	1006	1043	1003	1012	1064
Starting Vehs	227	135	234	210	156	156	144
Ending Vehs	226	229	230	233	262	277	261
Travel Distance (mi)	679	669	629	650	647	659	687
Travel Time (hr)	73.9	44.6	65.5	72.0	53.2	59.1	52.1
Total Delay (hr)	55.2	26.3	48.3	54.2	35.5	41.1	33.2
Total Stops	1649	1230	1532	1481	1532	1657	1606
Fuel Used (gal)	35.3	27.7	32.6	34.6	29.7	31.3	29.9

Interval #2 Information 2

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	7	8	9	Avg
Vehs Entered	1066	1112	1136	1104
Vehs Exited	1055	1060	1058	1044
Starting Vehs	191	176	155	180
Ending Vehs	202	228	233	237
Travel Distance (mi)	658	670	669	662
Travel Time (hr)	59.6	51.7	56.7	58.8
Total Delay (hr)	41.7	33.4	38.4	40.7
Total Stops	1542	1533	1562	1533
Fuel Used (gal)	31.2	29.7	30.8	31.3

Interval #3 Information 3

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1035	1000	959	1053	994	1019	995
Vehs Exited	1016	1024	993	1042	1033	1051	1004
Starting Vehs	226	229	230	233	262	277	261
Ending Vehs	245	205	196	244	223	245	252
Travel Distance (mi)	624	630	609	651	634	643	613
Travel Time (hr)	93.4	49.3	63.9	91.9	57.5	72.1	67.6
Total Delay (hr)	76.2	32.0	47.3	74.2	40.2	54.5	50.7
Total Stops	1482	1495	1319	1597	1680	1686	1641
Fuel Used (gal)	38.7	28.2	31.2	38.5	30.6	34.0	32.1

Interval #3 Information 3

Start Time	5:30
End Time	5:45
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	950	993	1032	1003
Vehs Exited	935	1006	1023	1014
Starting Vehs	202	228	233	237
Ending Vehs	217	215	242	228
Travel Distance (mi)	584	620	638	625
Travel Time (hr)	61.4	59.1	74.1	69.0
Total Delay (hr)	45.4	42.3	56.5	51.9
Total Stops	1236	1477	1561	1517
Fuel Used (gal)	29.9	30.3	33.8	32.7

Interval #4 Information 4

Start Time	5:45
End Time	6:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	10	2	3	4	5	6
Vehs Entered	1058	1014	974	1017	959	1013	1057
Vehs Exited	1062	1051	970	1037	990	1035	1039
Starting Vehs	245	205	196	244	223	245	252
Ending Vehs	241	168	200	224	192	223	270
Travel Distance (mi)	658	639	595	635	605	637	653
Travel Time (hr)	100.1	46.1	77.4	97.3	54.2	62.5	80.2
Total Delay (hr)	82.1	28.7	61.1	80.0	37.6	45.0	62.4
Total Stops	1574	1184	1186	1534	1372	1372	1829
Fuel Used (gal)	40.4	27.8	33.9	39.8	28.9	31.7	36.6

Interval #4 Information 4

Start Time	5:45
End Time	6:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	7	8	9	Avg
Vehs Entered	1020	1049	1053	1023
Vehs Exited	1019	1037	1048	1029
Starting Vehs	217	215	242	228
Ending Vehs	218	227	247	222
Travel Distance (mi)	620	641	651	633
Travel Time (hr)	79.5	71.6	75.7	74.5
Total Delay (hr)	62.5	54.2	58.0	57.2
Total Stops	1359	1536	1506	1445
Fuel Used (gal)	35.1	33.7	35.0	34.3

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	LT	R	L	T
Maximum Queue (ft)	230	399	413	304	345	2020	2004	280	520	236	169	238
Average Queue (ft)	109	370	358	223	344	1695	1662	78	302	119	88	100
95th Queue (ft)	258	429	440	443	347	2376	2372	264	528	204	160	201
Link Distance (ft)		304	304			1971	1971		1191	1191	451	451
Upstream Blk Time (%)		38	28	2		39	13					
Queuing Penalty (veh)		242	180	0		0	0					
Storage Bay Dist (ft)	230			310	345			280				
Storage Blk Time (%)	0	46	28	2	59	49	22	0		14		21
Queuing Penalty (veh)	1	31	102	8	398	318	16	2		24		7

Intersection: 1: Shelton Shop Rd & Garrisonville Rd

Movement	SB
Directions Served	R
Maximum Queue (ft)	90
Average Queue (ft)	33
95th Queue (ft)	85
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	90
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Intersection: 3: Garrisonville Rd & RIRO Dwy

Movement	EB	EB	WB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	421	435	3	128
Average Queue (ft)	176	177	0	46
95th Queue (ft)	408	434	3	93
Link Distance (ft)	1266	1266	304	388
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 1328